Coal Age

AUGUST, 1953

A McGRAW-HILL PUBLICATION — PRICE 50c

Auger Stretches Stripping Output

Auger takes over beneath 75-ft highwall and boosts Keeley's production to 2,400 tons per shift. p 74

Coal's Coming Role In U. S. Oil Needs

New light on coal's role in liquid fuels when our petroleum falters. p 70

Old Mine — New Start

For future needs, Sterling swings now to new machines, better mine layout and improved services. p 80

Growing by Service

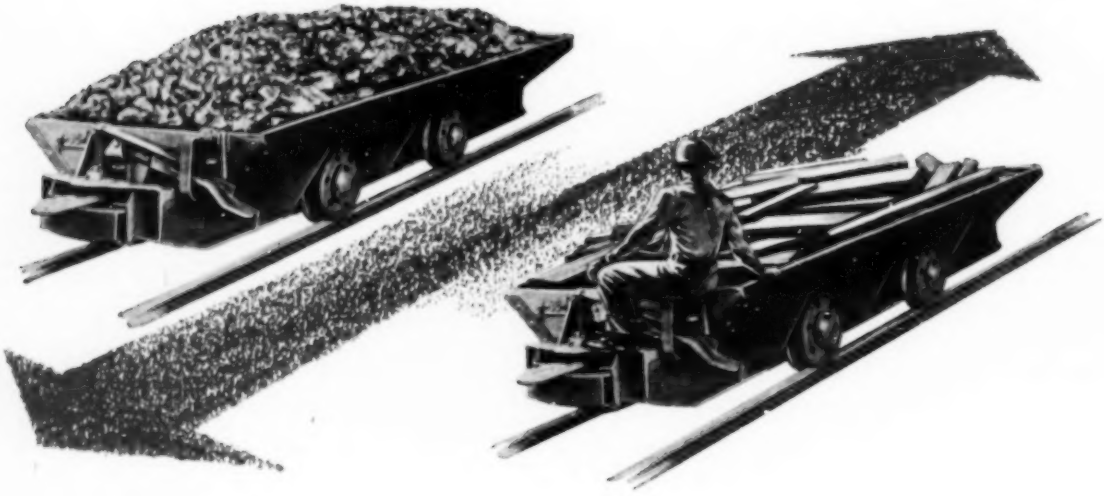
This anthracite veteran builds his truck trade by catering to customers. p 100

Flexible Shifting At TenMile Mine

How split-shift schedule smooths out operations and meets emergencies. p 94

Full Contents on p 5

2 PAYLOADS FOR THE PRICE OF 1



...because A.C.F. Mine Cars haul men and supplies *in*... coal *out*. You eliminate expensive duplicate transportation systems... get twice the work, twice the value.

There's no danger of production stoppage, either. Just switch a damaged car to a siding... repairs can easily be made by your own men... and keep production rolling Exclusive Drop Bottom design enables A.C.F. Mine Cars to unload *on the run*... at the rate of a ton a second.

You can see why it will pay to get all the facts from your A.C.F. Representative. Why not talk with him now? American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland Philadelphia • Huntington, W. Va. • San Francisco Washington • Berwick, Pa.

a.C.f.

MINE CARS

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

B. F. Goodrich belt stands up when coal pours down

BLOWS from sharp, heavy chunks of coal wreck an ordinary belt in short order. So B. F. Goodrich developed the Caricoal *cord* belt to cushion the shock of hundreds of tons of daily impact. Many mine operators save countless dollars with this longer-lasting B. F. Goodrich belt that has 2 to 6 times the impact resistance of fabric belts.

To increase its resistance to shock and impact, B. F. Goodrich builds an extra cushion of parallel cords, running lengthwise, into both the top and bottom of the belt. Each cord is completely surrounded by rubber—no cross threads tie them together—so they are free to give as heavy loads hit the belt. The rubber takes the shock.

In addition, the B. F. Goodrich cord belt has a patented *Transcord Breaker*. This extra layer of parallel cords in rubber, which is placed across belt width and around belt edges, keeps the cover from tearing off the belt under severe impact, prevents gouges and cuts from splitting the belt cover.

But this ability to absorb shock loads is just one of the reasons Caricoal cord belts last longer, serve better. Other construction features insure natural troughing under all conditions, and provide double protection against mildew. It'll pay you to let a BFG distributor show you how these longer-lasting conveyor belts can cut your coal handling costs, or send for the free booklet describing the B. F. Goodrich line of Caricoal conveyor belts.

The B. F. Goodrich Company
Dept. M-68, Akron 18, Ohio
Without cost or obligation, please
☐ send me booklet about B. F. Goodrich conveyor belts.
☐ have a BFG distributor see me.
Name_____
Company_____
Address_____
City_____ Zone_____
State_____

Caricoal Conveyor Belts
BY
B.F.Goodrich

There's a "JOHN HANCOCK"

John Hancock

"There — John Bull can read THAT without spectacles!" remarked John Hancock, as he boldly signed his name to the Declaration of Independence with a memorable flourish. And ever since, the term "John Hancock" has meant an outstanding signature, the kind to be relied on for dependability and results.

for LUBRICATION, *too!*

for instance . . . . . take the name

Hulburt *Quality* GREASE

When you see the "John Hancock" of HULBURT on the famous blue grease drums in your mine, you can depend on it—you won't need spectacles to read the resulting reduction in machinery operating and maintenance costs on your books.

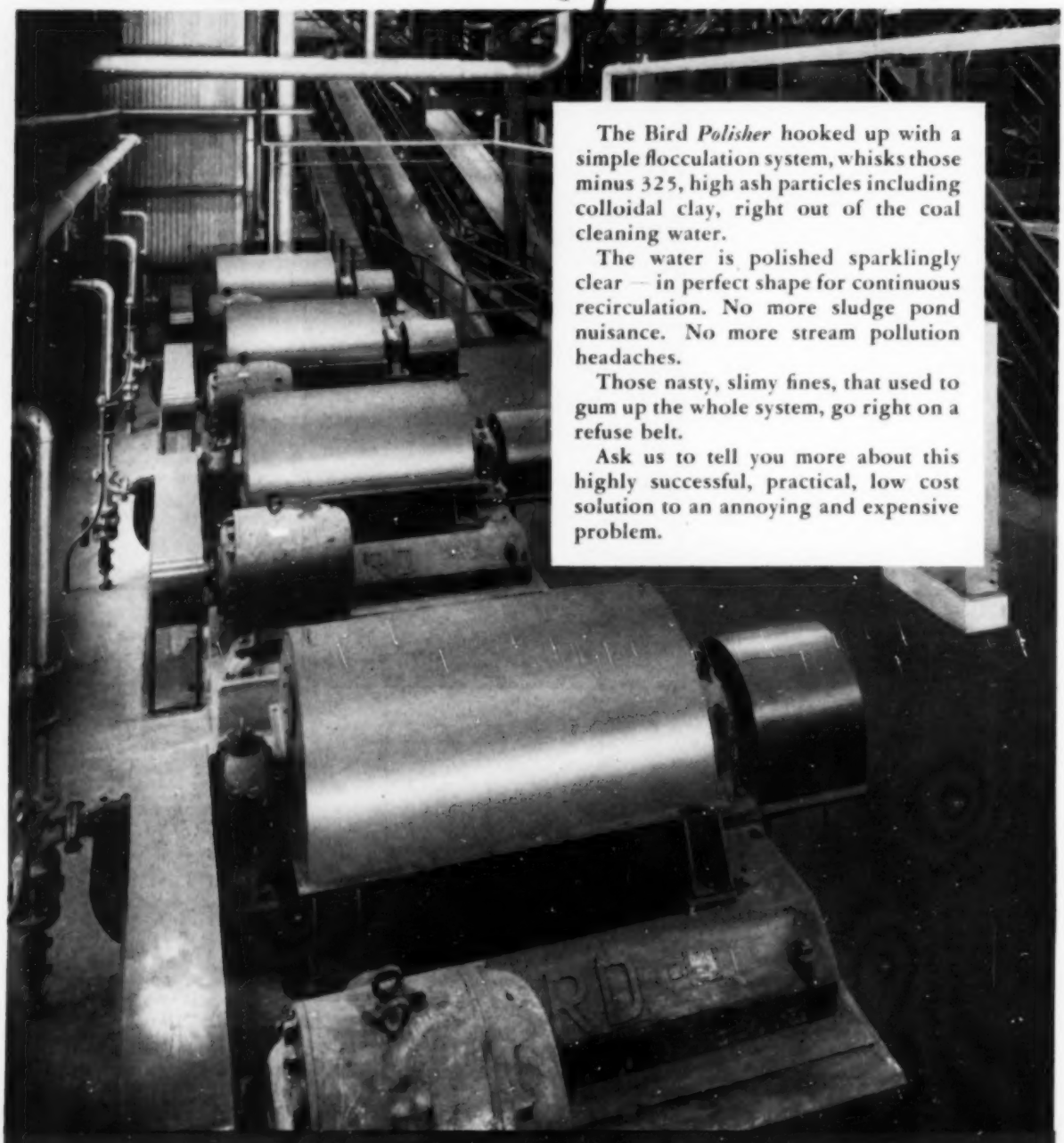
Yes, years of Hulburt experience in lubricating coal mining machinery (and sticking to that one job) prove that the name HULBURT QUALITY GREASE is the name to remember when you want dependability of satisfactory results.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

THESE ARE THE BIRDS THAT CLEAN THE WATER THAT CLEANS THE COAL

BIRD POLISHERS



The Bird *Polisher* hooked up with a simple flocculation system, whisks those minus 325, high ash particles including colloidal clay, right out of the coal cleaning water.

The water is polished sparklingly clear — in perfect shape for continuous recirculation. No more sludge pond nuisance. No more stream pollution headaches.

Those nasty, slimy fines, that used to gum up the whole system, go right on a refuse belt.

Ask us to tell you more about this highly successful, practical, low cost solution to an annoying and expensive problem.

BIRD MACHINE COMPANY
South Walpole • Massachusetts

Builders of the BIRD COAL FILTER that has dewatered better than twenty million tons of fine coal.

Coal Age

AUGUST • 1953

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NEXT MONTH . . .

MORE ON COST-CUTTING

"HOW TO CUT COSTS IN STRIPPING" will highlight the September issue of *Coal Age*. This fourth feature in our Cost-Cutting Series is a chapter-and-verse analysis of ways and means of raising efficiency in opencut work—and naturally is based on actual experience in the field. In addition to this special feature, *Coal Age* also has scheduled for an early issue a study of the methods followed by one stripping organization that have yielded major results in increasing yardage and tonnage per machine and per man. A vital ingredient is thorough study of both equipment and methods.

FIRST 153 YEARS

Anthracite contributes an off-the-beaten-track article for the September issue. It is the story of what has happened in the first 153 yr at the Summit Hill mine of the Lehigh Navigation Coal Co., the oldest coal mine still operating in America and looking forward to many more years of service to the Nation. Who started it, who carried it on, what their problems were and how they solved them are among the things you will find in this account of a monument to enterprise.

Enterprise also is the key word for today at coal mines whose life has been substantially less, as might be expected, than Summit Hill, though their contributions are equally significant. What management and men are doing to make these mines more efficient and safer to operate will continue to key *Coal Age* operations. Thus, future issues will include articles on anthracite stripping, mechanical mining in both thick and thin coal, modernizing haulage and communication, raising product quality, matching maintenance to modern equipment and methods, and other key operations in modern coal production.

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VOLUME 58 NUMBER 8

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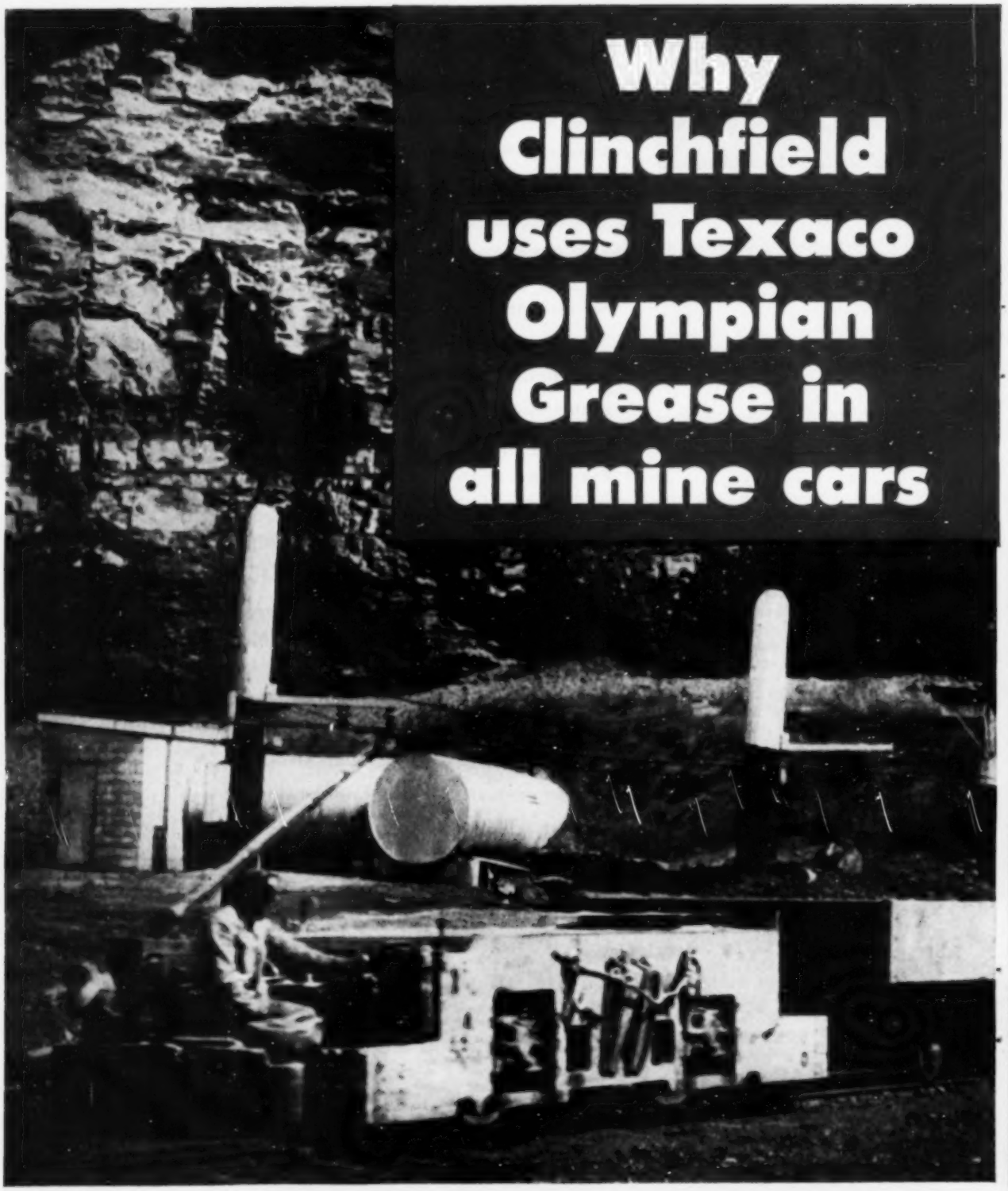


Why Clinchfield uses Texaco Olympian Grease in all mine cars

TEXACO

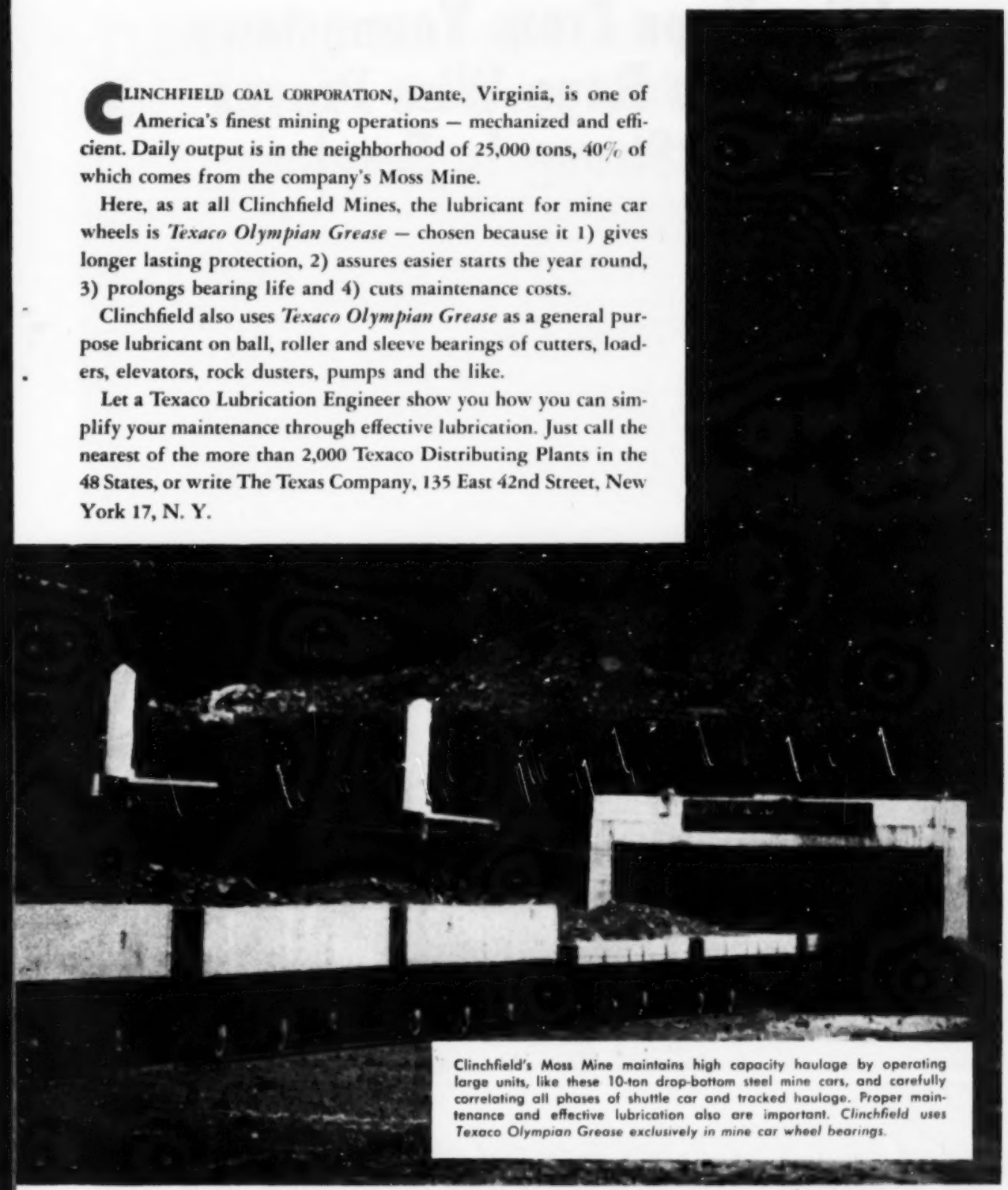
TEXACO

CLINCHFIELD COAL CORPORATION, Dante, Virginia, is one of America's finest mining operations — mechanized and efficient. Daily output is in the neighborhood of 25,000 tons, 40% of which comes from the company's Moss Mine.

Here, as at all Clinchfield Mines, the lubricant for mine car wheels is *Texaco Olympian Grease* — chosen because it 1) gives longer lasting protection, 2) assures easier starts the year round, 3) prolongs bearing life and 4) cuts maintenance costs.

Clinchfield also uses *Texaco Olympian Grease* as a general purpose lubricant on ball, roller and sleeve bearings of cutters, loaders, elevators, rock dusters, pumps and the like.

Let a Texaco Lubrication Engineer show you how you can simplify your maintenance through effective lubrication. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



Clinchfield's Moss Mine maintains high capacity haulage by operating large units, like these 10-ton drop-bottom steel mine cars, and carefully correlating all phases of shuttle car and tracked haulage. Proper maintenance and effective lubrication also are important. *Clinchfield uses Texaco Olympian Grease exclusively in mine car wheel bearings.*

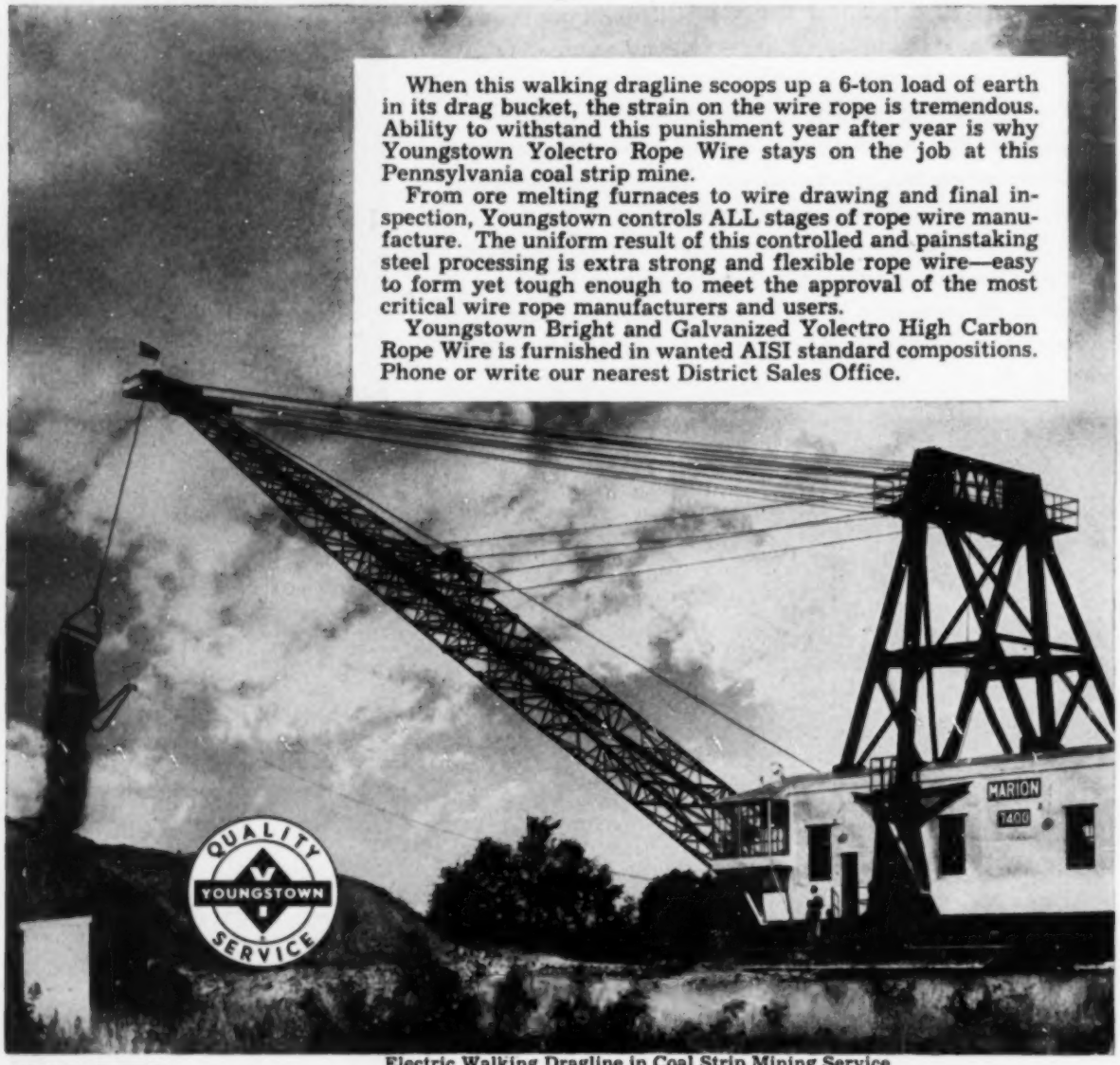
LUBRICANTS for the Coal Mining Industry

Wire Rope From Youngstown Yolectro Rope Wire Proves Extra Strong in Service

When this walking dragline scoops up a 6-ton load of earth in its drag bucket, the strain on the wire rope is tremendous. Ability to withstand this punishment year after year is why Youngstown Yolectro Rope Wire stays on the job at this Pennsylvania coal strip mine.

From ore melting furnaces to wire drawing and final inspection, Youngstown controls ALL stages of rope wire manufacture. The uniform result of this controlled and painstaking steel processing is extra strong and flexible rope wire—easy to form yet tough enough to meet the approval of the most critical wire rope manufacturers and users.

Youngstown Bright and Galvanized Yolectro High Carbon Rope Wire is furnished in wanted AISI standard compositions. Phone or write our nearest District Sales Office.



Electric Walking Dragline in Coal Strip Mining Service at Buckeye Coal Co., Grove City, Pa.

Youngstown YOLECTRO HIGH CARBON ROPE WIRE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

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RAYON Makes Coal-Flo Conveyor Belting 8 Ways Better

HERE are 8 reasons why a rayon-bodied Coal-Flo conveyor belt, quality-proved by 10 years of field tests, is your best buy:

1 Balanced Construction—all plies of same, special woven rayon duck having balanced cross-directional strength. Assures proper ply relationship and uniform load distribution.

2 Better Troughability—superior to that of other duck belts of 25% less strength. Results in less belt wander and less edge wear.

3 Greater Fastener Holding Strength—20%-60% greater than belts of similar troughability. Means fewer failures and less maintenance.

4 Low Stretch—up to 50% less than other belts. Reduces need for long costly take-ups often impossible in limited space.

5 Long Flex Life—carcass is 30% thinner than with other duck belts of same strength. Bending is easier—flex resistance greater.

6 Light Weight—rayon weighs 35% less than ordinary fabrics of equal strength. Permits higher pay load. Makes belt easier to handle.

7 High Tear Resistance—strong transverse threads resist lengthwise tears better than heavier, stiffer ducks. Cuts down on repairs.

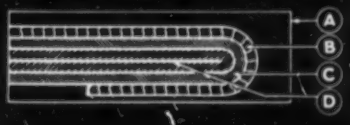
8 Mildew Resistance—exclusive inhibitor, thoroughly proved in 25 years of field use, protects belt against mildew-caused rot.

For more reasons why you should buy Coal-Flo, see your G.T.M.—Goodyear Technical Man.

GOODYEAR INDUSTRIAL PRODUCTS

GTM-Specified

Rayon Coal-Flo Conveyor Belts-



- **A** Tough, thick cover of acid-resistant rubber
- **B** Sturdy horseshoe breaker protects ply edges from fraying and wicking moisture
- **C** Plies of superstrong rayon fabric
- **D** Rubber skim-coat between plies increases flex life

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose (air, water, steam, oil, special), Belting (V-Belts, transmission, conveyor, elevator), and other industrial rubber products. Look for him in the Yellow Pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

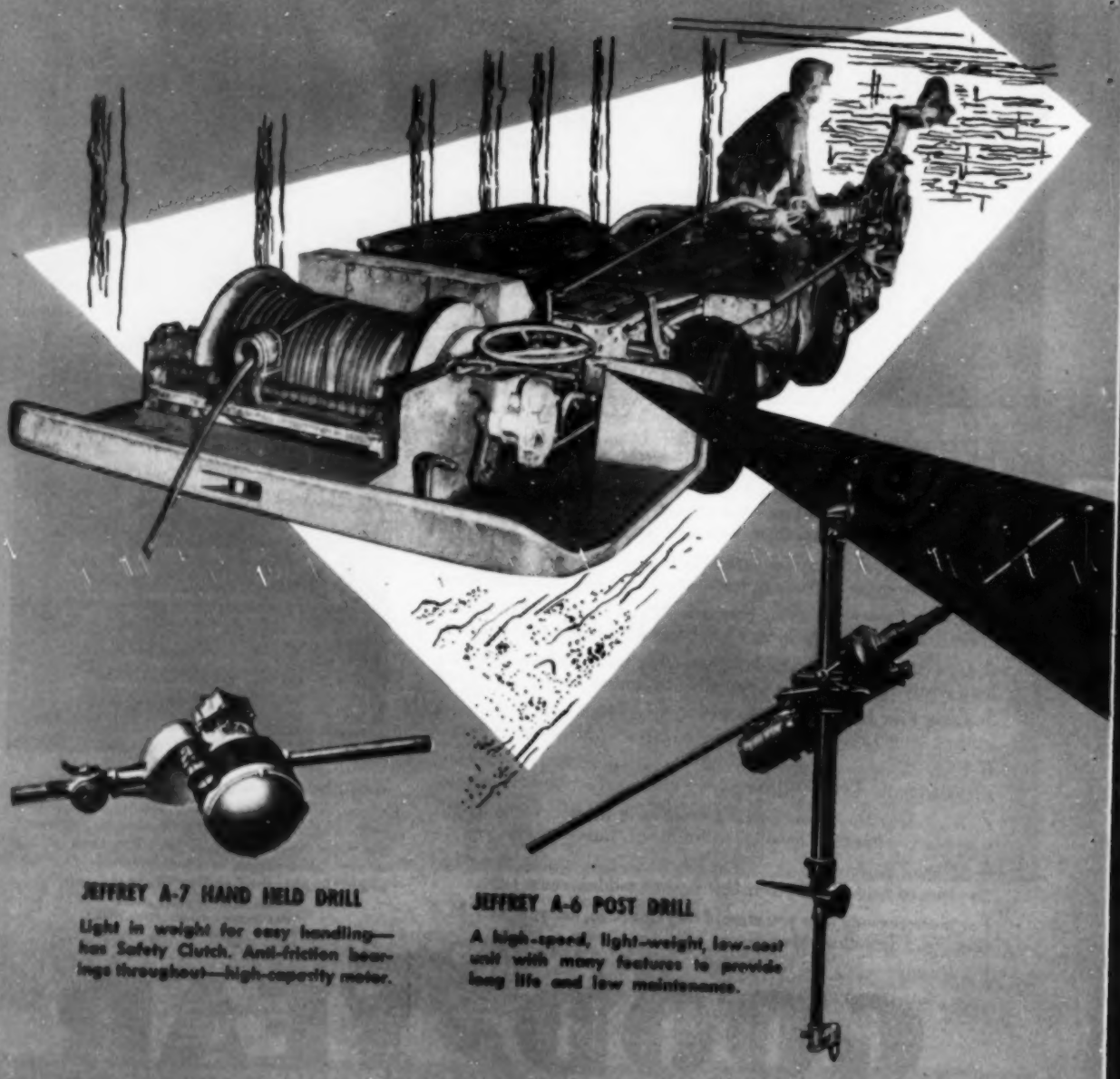
THE GREATEST NAME IN RUBBER

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

high-speed drilling in modern trackless mines with

JEFFREY DRILLING MACHINES

The Jeffrey 56-FHR Drilling machine, illustrated below, is completely hydraulic in operation. With many adjustments, it affords the utmost flexibility of operation in swinging the drilling head in any desired position—quickly, easily and accurately—for shot hole placement. For modern, high-speed drilling specify the Jeffrey 56-FHR unit. Write for complete details.

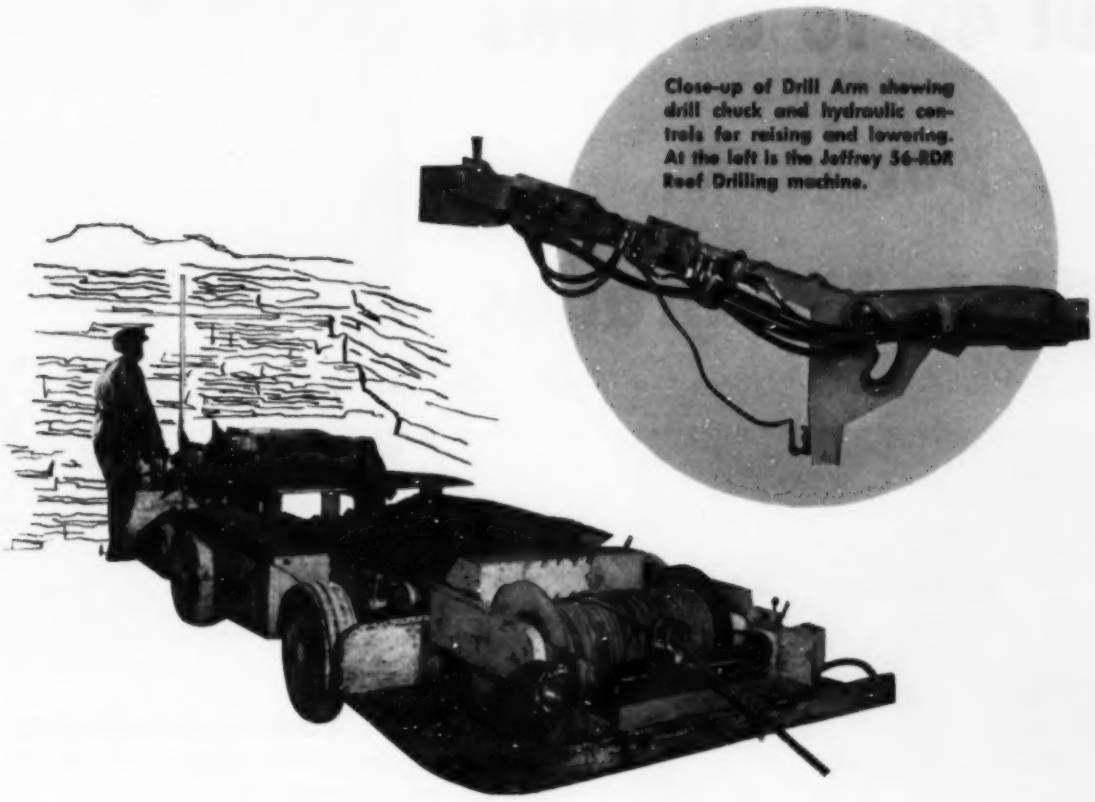


JEFFREY A-7 HAND HELD DRILL

Light in weight for easy handling—has Safety Clutch. Anti-friction bearings throughout—high-capacity motor.

JEFFREY A-6 POST DRILL

A high-speed, light-weight, low-cost unit with many features to provide long life and low maintenance.



Close-up of Drill Arm showing drill chuck and hydraulic controls for raising and lowering. At the left is the Jeffrey 56-RDR Roof Drilling machine.

. . . and high-speed roof drilling for roof bolting operations

JEFFREY ROOF DRILLING MACHINES

The Jeffrey 56-RDR Roof Drilling machine has a rubber-tired truck and a drill boom which is swung horizontally and raised vertically by hydraulic power. Hydraulic motor drives drill socket as well as torque wrench used for anchoring and tightening bolts. A straight-line feed for the drill is maintained at all times. When swung horizontally the boom provides a reach of 10' 10¼" maximum right and left. Bulletin No. 831 goes into more detail. Send for it.

Jeffrey has a world-wide reputation for sound engineering, quality workmanship and material. Whether it's below or above ground . . . Jeffrey leads the way.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

Haul 40 to 60 tons per load up 10 to 15% grades

Giant 50-ton Tournarocker is loaded with 7 to 8 passes of 5-yd. shovel. Large bowl (13' x 17') makes easy shovel target, speeds loading. With 90° power steer and electric controls, Tournarockers get under shovel faster, position for dump faster than conventional haulers. Tournarockers can turn around in 15'8" radius.

Big "A" Tournarockers

CORREALE CONSTRUCTION CO., Hazleton, Pa. — contract-stripping for Philadelphia & Reading Coal & Iron Co. at Minersville — has a rugged hauling job on its hands. Overburden and coal from a 140' anthracite vein must be trucked 3000' to one mile up continuous 10 to 15% grades. Because haul road moves frequently with the excavation, it is of temporary construction. It

Rig dumps 40 tons of coal into cleaner plant hopper in 17 seconds. Simple fingertip electric controls operate dump, shift, steer. Big 4-wheel air brakes (9408 sq. in., total braking surface) stop rig on a dime . . . assure perfect safety on hills.

Tournarockers swing around in a tight U-turn at the pit and back into loading position, 1 on either side of the shovel. Note how prime-mover and body tilt independently (up to 30° oscillating pivot) to eliminate twisting and strain.

High-speed, rubber-tired hauling • lifting • excavating •

Loaded with 40 tons of coal, Tournarocker climbs .6 mile of 10% grade on haul to cleaner plant. Special extension lip built at rear of bowl keeps coal from spilling out on uphill haul, and increases coal-carrying capacity by about 10 tons.

lick tough stripping job

is rough, bumpy . . . has several hairpin curves, and crosses a main highway. From 2500 to 3750 tons of coal alone must be hauled up the road to the plant daily. Also, the overburden that covers an equivalent tonnage must be moved.

4 "A's" do work of 11 trucks

Under these conditions, Correale hauls both shot rock overburden when stripping, and coal on the loading operation, with 4 king-sized 50-ton A Tournarockers. Where coal is handled, load time for 40 tons averages 3⅓ minutes. Load time for 50 to 60 tons of straight overburden averages 5 minutes. For coal loads, cycle of 1.2 miles to and from the cleaner plant takes 18.8 minutes, despite the steep grades, sharp switchbacks, and U-turn made to back into hopper channel. For overburden, cycle of 2 miles to spoil bank takes about 20 minutes. With this steady, high-speed performance, Correale reports they move as much rock and coal with their *four* 450 hp Tournarockers as they formerly hauled with *eleven* 15 to 22-ton trucks!

For low-cost, heavy-duty hauling . . . on or off the road . . . you'll want to get all the facts on Tournarocker. Available in sizes from 9 to 50 tons. Ask your LeTourneau Distributor for owner-verified reports covering work like yours. No obligation, of course.

Interesting facts on Correale's job

Depth of anthracite vein	140′
Present depth of cut	270′
Eventual depth of cut	340′
Quantity of coal removed to date	4,000,000 tons
Estimated coal still unworked	1,000,000 tons
Length of haul from pit	
For coal	0.6 mile
For overburden	1.0 mile
Nature of haul	All uphill, 10 to 15% grades
Hourly plant output, coal (90% handled by Tournarockers)	200 tons*
Average daily plant output (14-hour day)	2500 tons*
Record daily plant output (14-hour day	3750 tons*

*NOTE: Weight of processed coal only. Does not include stockpiled coal, nor rock overburden delivered with coal and removed from conveyor belt before weighing. Overburden hauled direct to spoil bank also not included.

What Correale operators say:

John McCann . . . "Tournarockers have lots of guts. We pull heaped loads up these steep grades in 2nd gear (6½ mph) — have power to spare. Electric controls don't give us a bit of trouble."

Cletus Tobin . . . "Tournarockers are a lot easier to handle than other haulers. You don't have to fight a steering wheel all day — just use that 'fingertip control'. You can turn around on a dime."

Stephen Autolesky . . . "There's nothing like Tournarockers for this hauling. I wouldn't want to drive a truck anymore. Fingertip controls sure save a lot of work for us drivers."

Tournarocker—Trademark Reg. U.S. Pat. Off. AR-302-CM

equipment

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

Wire Rope at Work—The aerial tramway is an ingenious device that carries large quantities of material over considerable distances. Here's one at a Pennsylvania bituminous mine disposing of waste from the underground workings. It consists of a continuous tram from tipple to refuse hopper, and two spur lines, or legs, to the dump piles.

The system handles more than a million tons of waste per year. Loads are carried first to the hopper in overhead cars, then are transferred to other cars which run above the dumping grounds. Nearly nine miles of Bethlehem Wire Rope is used in the tracks, haulage lines, and guard screen cables, and these ropes of course are the very heart of the system. They bear the brunt of a handling job that is rough and tough; one in which only the best wire rope could survive.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING

BETHLEHEM STEEL

BETHLEHEM WIRE ROPE

Carboloy Mining Tools

cemented carbide

outlast steel tools up to 50 times

Help you mine more coal per man Lower your tool cost per ton

You're after extra tonnage. Carboloy Mining Tools will give it to you – *at less tool cost per ton.* These mining tools are mine-designed, mine-tested and mine-proved to be as efficient as man can make them.

Actual mine tests, pitting Carboloy Carbide Mining Tools against standard steel tools under comparable conditions, have produced amazing–but expected–results. In every case, the Carboloy Mining Tools outproduced and outlasted the steel tools – by overwhelming margins.

The reason? Carboloy Mining Tools are tipped with cemented carbide – the hardest metal made by man. These tools outlast and outperform steel tools because *they are many times harder than steel.*

You, too, can get record tonnage, unbelievable tool economy and lower cost per mined ton with Carboloy Cemented Carbide Mining Tools because they:

- **Cut more coal per shift under equal conditions**
- **Stay sharp longer**
- **Take regrind after regrind long after steel tools are scrapped**
- **Require less power . . . operate more efficiently**
- **Cut cleanly, reduce wear on expensive machinery**
- **Require less reconditioning . . . get back on the job quicker**

Specify

CARBOLOY

CEMENTED CARBIDE

THE QUALITY BRAND OF MINING TOOLS

Silver Anniversary 1928 1953 QUARTER CENTURY OF PIONEERING IN CREATED-METALS CARBOLOY

See the CARBOLOY MINING TOOLS AND SERVICES on next 3 pages

CARBOLOY
CEMENTED CARBIDE
MINING TOOLS

Designed and

Why you can expect—and get—quality performance from Carboloy Mining Tools

In mining tools, "Carboloy" and "quality" are synonymous. Into every Carboloy cemented carbide Mining Tool goes painstaking research, skillful engineering, rigid production standards, never-ending checks in the mines . . . many things.

This quality is built into every Carboloy Mining Tool by the oldest and largest American producer of cemented carbides.

This quality pays off for you in top-notch tool performance. Replace your steel tools with Carboloy Carbide Mining Tools. They'll help you reduce downtime, cut more coal. You'll get less tool breakage . . . longer tool life . . . greater tool economy.

Check your requirements against this list of Carboloy Mining Tools. Then order now from your local Authorized Carboloy Mining Tool Distributor. He's listed on the back of next page.

CC-1
Medium-Duty Bit

Excellent for undercutting. Narrow point requires less power to cut. Strong braze holds carbide insert solidly in the heat-treated steel shank under severest strains. Easy to sharpen. Can be set to any gauge size.

SPECIFICATIONS			
Order No.	Width	Height	Length
CC-1	½"	1"	4"

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 5000-9999
CC-1	25	$0.93

CC-2
Heavy-Duty Bit

Features extra-sturdy braze and dependable mechanical holding for tip. Design of heat-treated steel shank helps cuttings flow unimpeded. Bit can be set to any gauge size. Large carbide tip wears and wears.

SPECIFICATIONS			
Order No.	Width	Height	Length
CC-2	½"	1"	4"

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 5000-9999
CC-2	25	$1.13

CC-3
Extra Heavy-Duty Bit

For extremely rugged undercuttings. Designed with stop to keep cutter from slipping in lugs . . . has extra-heavy tip . . . heat-treated steel shank.

SPECIFICATIONS				
Order No.	Width	Height	Length	Stop
CC-3	½"	1"	3⅛"	1⅛"

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 5000-9999
CC-3	25	$1.25

Finger Bit

Extra-strong braze of carbide tip to heat-treated shank enables it to withstand abrasive wear of siliceous materials and jarring impact of hard, flinty formations. Tops for gouging out hard-to-take-hold-of overburden.

SPECIFICATIONS			
Order No.	Width	Height	Length
FB-8-3	½"	½"	2⅛"
FB-8-5	½"	½"	3"

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 5000-9999
FB-8-3	25	$1.15
FB-8-5	25	$1.15

Prices and specifications subject to change without notice.

Specify → CARBOLOY
CEMENTED CARBIDE

built for outstanding results

Square-Shank Auger Drill

Dual purpose bit for blast holes and starter holes. Equally efficient with post, machine-mounted or push-type rotary drilling equipment.

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
AD-28	1⅛"	3⁷⁄₁₆"	½" sq.
AD-30	1⅛"	3⅞"	½" sq.
AD-32-2	2"	3¹¹⁄₁₆"	⅝" sq.

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 1000 and up
AD-28	4	$4.30
AD-30	4	$4.40
AD-32-2	4	$4.50

Hex-Shank Auger Drill

Engineered with maximum relief and clearance angles. Use with any standard auger steel . . . post, machine-mounted or push-type equipment.

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
AD-36	2¼"	4¹⁄₁₆"	¹¹⁄₁₆" hex
AD-40	2½"	4⁵⁄₁₆"	¹¹⁄₁₆" hex
AD-44	2¾"	4¹¹⁄₁₆"	¹¹⁄₁₆" hex

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 1000 and up
AD-36	4	$5.30
AD-40	4	$5.95
AD-44	4	$6.75

V-Prong Auger Drill

Another improved Carboloy tool, made available after exhaustive mine tests. New design gives you faster drilling of friable or medium formations.

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
ADN-28	1⅛"	3⁷⁄₁₆"	½" sq.
ADN-30	1⅛"	3⅞"	½" sq.
ADN-32-2	2"	3¹¹⁄₁₆"	⅝" sq.

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 1000 and up
ADN-28	4	$4.30
ADN-30	4	$4.40
ADN-32-2	4	$4.50

Roof-Bolting Drill (solid type)

Tops for all-round roof-bolting economy. Design minimizes rifling in friable formations . . . virtually eliminates drill drag. Heavy carbide tip means fewer drill changes.

SPECIFICATIONS			
Order No.	Diameter	Length	Shank
PT-22	1⅛"	3¹⁄₃₂"	½"
PT-24	1½"	3¹⁄₃₂"	½"

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 1000 and up
PT-22	4	$4.00
PT-24	4	$4.30

Roof-Bolting Drill (prong type)

Adaptable to wet or dry drilling. Slot in shank directs water to tips for cooling and dampening down of cuttings; lets you drill at top speeds. Heat-treated shank is sturdy, tough, dependable.

SPECIFICATIONS				
Order No.	Diameter	Length	Shank	S ot
APT-22	1⅛"	2¹⁵⁄₁₆"	½" sq.	.275

PRICES		
Order No.	Std. Pkg. Quantity	List Price Each 1000 and up
APT-22	4	$4.30

Live-Spiral Masonry Drill

Useful for many maintenance jobs in your mine, such as drilling holes for hanging anchors for lights, trolleys, etc. Oval-flute prevents packing, stalling . . . lets you rotary drill hard formations fast, continuously.

Available in all the popular diameter sizes from 3/16" through 1". Sizes over 1" are available with straight fluted shanks. Send coupon on back for complete specifications and prices.

"Carboloy" and "Live-Spiral" are registered trademarks of the Carboloy Department of General Electric Company

Prices and specifications subject to change without notice.

THE QUALITY BRAND OF MINING TOOLS

Take advantage of these Carboloy services

FAST LOCAL DELIVERIES

AUTHORIZED CARBOLOY MINING TOOL DISTRIBUTORS

No need to overtax your shelves and tie up capital with heavy inventories of mining tools. Not with Authorized Carboloy Mining Tool Distributors so near . . . ready to rush you deliveries at a moment's notice.

They maintain complete stocks of Carboloy Mining Tools right in your area. They're up-to-the-minute on carbide mining tool use and maintenance techniques. And it's a matter of pride with them to give you faster service than you'll get anywhere else on all your mining tool needs.

ALA.	**Birmingham 2** Young & Vann Supply Co.
COLO.	**Denver 17** Mine & Smelter Supply Co.
ILL.	**Christopher** E & E Mine Service Co.
IND.	**Terre Haute** The Mine Supply Co., Inc.
KY.	**Harlan** General Electric Supply Corp. Kentucky Mine Supply Co., Inc.
MO.	**St. Louis 3** Tools & Supplies, Inc.
N. MEX.	**Carlsbad** El Paso Saw & Belting Co.
OHIO	**Cambridge** Cambridge Machine & Supply Co.
OREG.	**Portland** J. E. Haseltine & Co.
PA.	**Johnstown** General Electric Supply Corp. Quaker Sales Corp.
	Washington Fairmont Supply Co.
TENN.	**Knoxville** W. J. Savage Co.
TEXAS	**El Paso** El Paso Saw & Belting Co.
UTAH	**Salt Lake City** Mine & Smelter Supply Co.
VA.	**McClure** Erwin Supply & Hardware Co., Inc.
W. VA.	**Bluefield** Bluefield Supply Co. Rish Equipment Co.
	Fairmont Fairmont Supply Co.
	Montgomery Marathon Coal Bit Co.

3-Point Service Program

The Carboloy 3-point Program was set up to help you get all the benefits that Carboloy Mining Tools can deliver. Use any or all of these free services to get maximum production and efficiency from carbide tools.

Training course for key personnel. Features instruction and demonstration of best grinding and maintenance practices. Theory is followed up with practice in completely equipped grinding rooms. Send coupon for complete information on next session.

Free technical literature. Timesaving, money-saving mining tool information is available free on request. Catalog contains maintenance instruction manual with step-by-step suggestions for the proper maintenance of carbide mining tools. Send coupon.

Complete Field Service Organization. Get competent, qualified assistance on any problems concerning application or maintenance of carbide tools. Just contact your nearest Carboloy Field Representative, phone your local Authorized Carboloy Mining Tool Distributor, or send coupon.

Carboloy Department of General Electric Company
11120 E. 8 Mile Street, Detroit 32, Michigan

Rush me, free of cost or obligation,

- ☐ Catalog and Maintenance Instruction Manual CM-110 and Supplement CM-112.
- ☐ Masonry Drill Folder MD-145.
- ☐ Data on tuition-free Customer Training School.
- ☐ Have a Field Representative call on me.

Name_____ Position_____

Company_____

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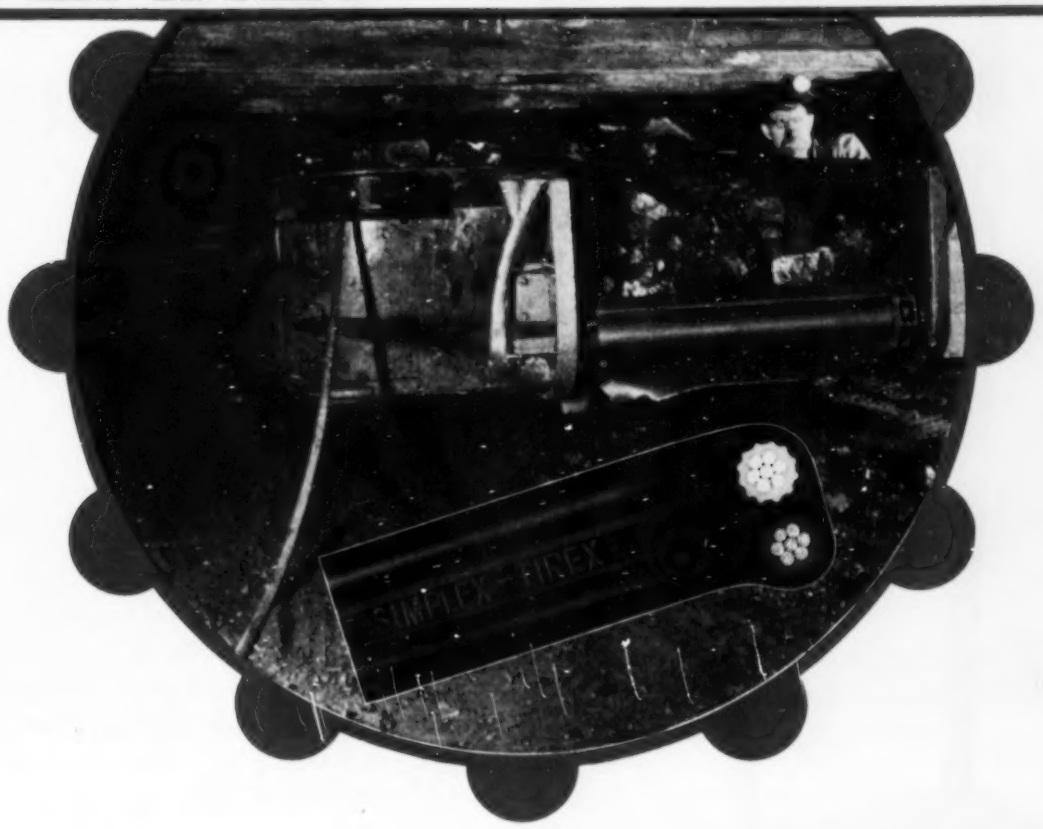
City_____ Zone_____ State_____

✓and mail today

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
Detroit 32, Michigan

GEARED for ACTION



Simplex-TIREX Shuttle Car Cables are "geared" for your protection. They assure you of top quality performance under the severe strains of modern mechanized mining. Only TIREX has insulated conductors that are "geared" to firmly interlock with the jacket.

TIREX Shuttle Car Cables are "geared" for action against the continual yanking and pulling of the cables as they are reeled and unreeled, while the shuttle car moves back and forth about the mine. For added protection all TIREX Shuttle Car Cables are **cured in lead.** They resist snagging, abrasion, oils and flame.

Why not specify and get TIREX Shuttle Car Cables. They always mean safety, economy and efficiency. For information on this or other members of the Simplex-TIREX family, write in care of the address below.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

REPUBLIC ROOF BOLT—*A ¾-inch rolled-thread bolt with square-head and forged washer for additional bearing surface. May be used in combination with roof channels, roof ties, roof plates or angle washers.*

REPUBLIC SLOTTED ROOF ROD—*A one-inch rolled-thread rod with slotted end to take wedge. Furnished with hex or square nuts and various size roof plates.*

Republic

Mine Roof Bolts

Two Types for Safer Mining Operation!

To help mine operators minimize the danger of roof-fall accidents, Republic makes two types of roof supports—the square-head bolt and slotted roof rod. They may be used for vertical or angle bolting depending on type of strata encountered.

All the qualities of the Upson Line of headed and threaded products are featured in Republic Roof Bolts. Shanks are tough and sturdy to withstand shock and vibration. Threads are clean, sharp and accurate for full-strength bolting-up. Nuts and bolt heads are square-faced for snug wrenching with less chance for slipping or deforming.

Republic Roof Bolts are made in a variety of lengths from 18 inches to 90 inches—special lengths on request. Write us for additional information.

REPUBLIC STEEL CORPORATION
Bolt and Nut Division • **CLEVELAND 13, OHIO**
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC *Upson Quality* **BOLTS AND NUTS**

Other Republic Products Include Machine, Tank and Carriage Bolts • Lag and Cap Screws • Track Bolts and Spikes • Pipe, Sheets and Wire

The CONTINUOUS MINER

Gives You Advantages that Protect and Increase Your PROFIT MARGIN

- ★ Maximum Total Recovery
- ★ Favorable Size Consist
- ★ Stay-on-the-Job Toughness
- ★ Rock-bottom Cost per Ton

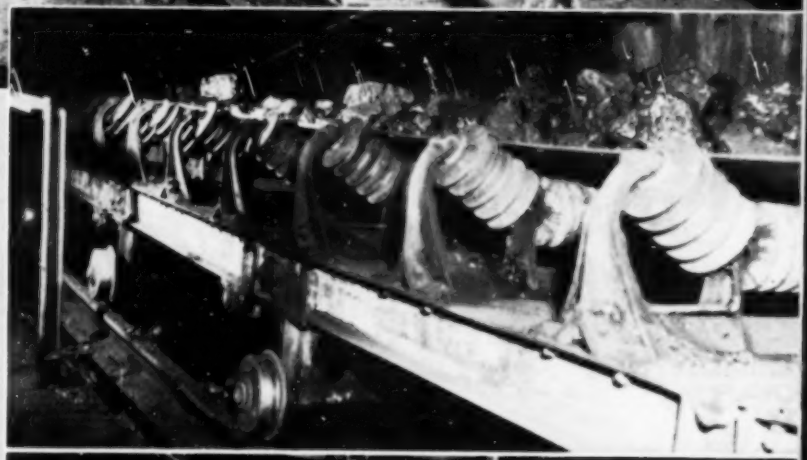
The benefit that Joy Miners can bring you is not fancy, but fact—*proved in the field* by scores of JCM units working in every producing area and under all conditions from thin to full-seam mining.

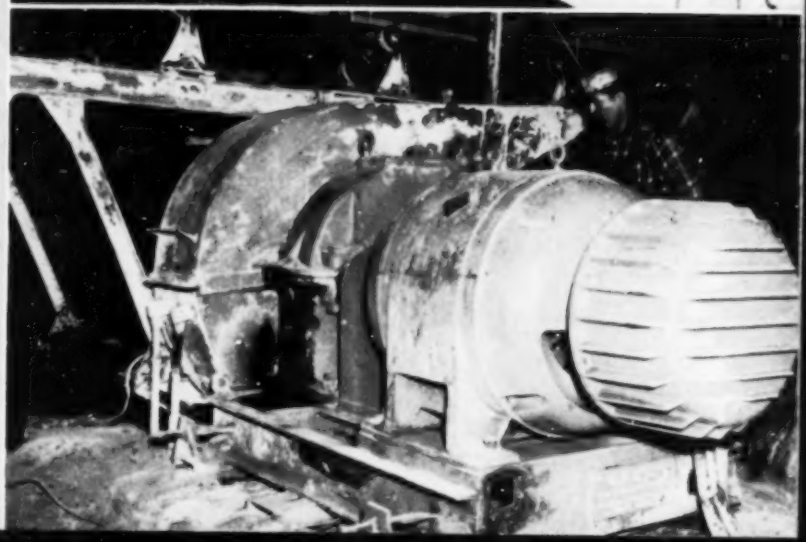
Joy Continuous Miners are fast, tough and flexible. They're built to stand up . . . and to do every job you ask of them—from the original development work to taking pillar—at the absolute minimum cost per ton. Total recovery of 80% or better is common, and in some cases exceeds 90%. Why not look into it? Our engineers are at your command, any time! ● ***Joy Manufacturing Company, Oliver Bldg., Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT



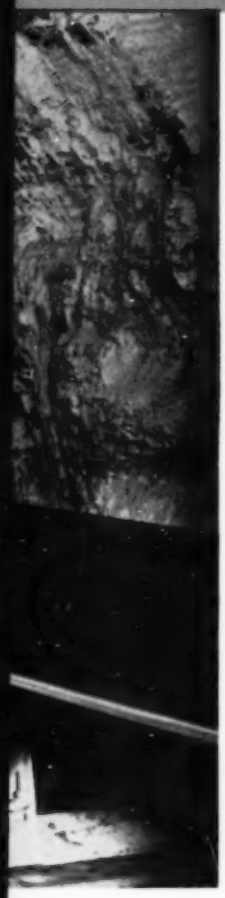


FACTS and FIGURES ON THIS ALL-BELT JOB

36" panel belts carry the coal from working areas and deposit it on 42" sub-main haulage belts running from either side (five each way) to a 48" main haulage belt for delivery to a storage hopper. The 42" belts are projected to 9000' from the main belt, with a drive unit every 4000'. Coal flows at 500 fpm on the 42" belt, and at 600 fpm on the 48" belt.

All 42" and 48" conveyors are of Joy knockdown type, with heavy duty idlers, drives and take-ups, and with impact idlers where required to absorb shock of large lump transfer. A 48" transfer belt, with Joy impact idlers throughout, takes the discharge from each 42" belt, reducing wear and impact damage on the 48" main belt. A unique 60" Joy shuttle feeder belt serves the storage hopper, and a 48" feeder takes the coal from the hopper to a 48" steel cable slope belt for delivery out of the mine.

Although rated at 1000 TPH on this job, installed in a highly modern mid-western operation, a Merrick weightometer has shown up to 2400 TPH going over the 48" belts.



Anything from a single belt to an all-belt conveying system like the job illustrated at left

...Let Joy Engineer it

SPECIAL FEATURES GIVE YOU EXTRA ADVANTAGES

The Joy line includes a complete selection of belt conveyors to meet any underground operating condition for gathering, main line or slope haulage—and any requirement above ground as well. They're built in any required width from 26" to 48", and in a wide range of styles and sizes. All Joy Belt Conveyors feature refinements of design and materials which insure rugged, heavy-duty construction, and provide field-proven dependability and low maintenance.

KNOCKDOWN DESIGN MAKES ADVANCING FAST AND EASY

Strong, pan-type intermediate sections are produced in 8', 9', 10' or 12' lengths, with idler spacings to suit the job and with 4", 5" or 6" dia. rolls. They're built to secure the maximum ratio of strength to weight, and the component parts bolt together to form extremely rigid, dependable units.

Joy "knockdown-type" conveyor sections are highly appealing features to most operators. They provide the easy portability so essential in low coal, and in any seam, they greatly reduce the labor and down-time losses of conveyor advances or change-overs.

HEAVY DUTY IDLERS, DRIVES, ETC.

Joy idler rolls are regularly supplied either with sealed-for-life ball bearings, requiring no attention, or with grease-type roller bearings as desired. Both styles are built for severe service, but in addition, we have developed a new series of heavy-duty belt idlers which offer the ultimate in high-tonnage, high-speed transport of bulk material, with long service life and low repair costs. With a 48" belt, the new idlers are rated to carry 1300 tons per hour at a belt speed of 600 feet per minute, and actual performance has reached 2400 TPH.

Investigate the benefits of Joy Heavy Duty Idlers on your belt haulage jobs. And remember, Joy is the only manufacturer of both tandem-pulley conveyor drives and direct-connected, totally-enclosed single pulley drives. We have the experience and the equipment to answer your conveyor problems *best* . . . let us help you.

● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

W&D CL 4606

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

The 6-SC SHUTTLE CAR

can cut your haulage costs

Can't beat it for speed and flexibility in medium-low coal

In its field, this newest-model Joy 6-SC Shuttle Car is the best assurance of low-cost, high-capacity haulage you can get—and here's why.

First, it's field-proved as the fastest and most dependable car in its class. The 6-SC makes time where it counts . . . in continuous operation from the face to the discharge point and back again.

Second, this year's model includes many improvements, modifications and additions that greatly increase its serviceability and all-around efficiency. Motors, gearing, wheel units, brakes and frame are all overcapacity, and it has interchangeable wheels and non-slip drive, plus such Joy-pioneered features as power steering and airplane-type disc brakes.

The Joy 6-SC has 4-wheel positive drive, 4-wheel hydraulic steering, and hydraulically adjustable elevating discharge. It is built in five heights from 29" to 38½" without sideboards, with a capacity range from 100 to 180 cu. ft.

● Other Joy Shuttle Cars include a type for every mining condition. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

One hose handles them all!

VERSICON, Thermoid's versatile, all-purpose hose, handles virtually any type of gas or liquid . . . makes stocks of many different types of hose unnecessary. You save through reduced inventories, simplified buying and less storage space. Losses from end remnants are greatly reduced.

VERSICON Hose is built to last. Synthetic oil-proof tube is reinforced with braided, high-tensile rayon. Tough oil-proof cover resists weather and abrasion.

For quick, easy identification, VERSICON has a brown cover. It's available in sizes from 3/16" to 1½" in lengths to fit your requirements.

In addition to various kinds of multi-purpose hose, Thermoid makes hose for certain specific applications, such as paint spray, suction, creamery, etc. Call your Thermoid Distributor. He can supply you with the Thermoid Hose best suited for your requirements. Or write direct for Catalog No. 3680.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

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You get more miles for your gearing dollar because G-E gears and pinions can "take it"

Reliable, low-cost transmission of driving power from traction motor to axle depends largely on gears and pinions that are built to "take it." That's why it's a wise move to always specify genuine G-E gears and pinions for your G-E mine locomotives.

G-E gears and pinions are made from materials specially developed for transportation equipment, and offer a hard, long-lasting working surface that resists fatigue failures and helps maintain the earning power of your G-E mine locomotives. Their superior strength minimizes tooth breakage caused by heavy loads under starting conditions, shock loads, and impacts. Their toughness, too, helps support compressive loads between tooth surfaces. In addition, G-E gears and pinions have a high degree of profile accuracy for smoother operation at all speeds.

To get top performance—"original equipment" performance—from your G-E mine locomotives, always specify genuine G-E gears and pinions. They're the best you can buy for your G-E mine locomotives. For full pricing and product information, contact your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

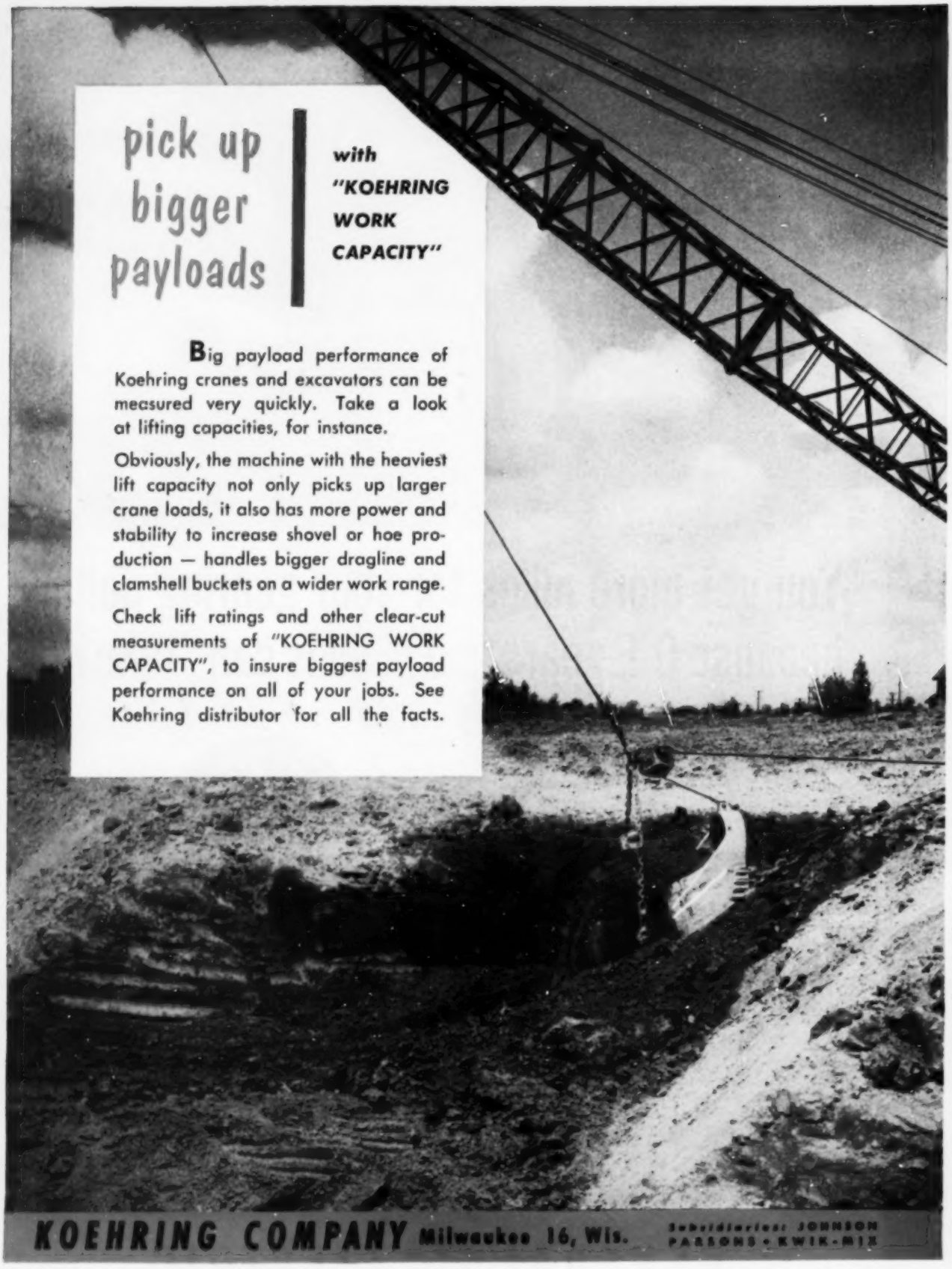
12B-14

WHY G-E GEAR TEETH ARE STRONGER

G-E gear and pinion tooth strength is the result of advanced design and manufacturing techniques. The G-E long and short addendum tooth form and continuous radius fillet actually result in 10 percent more strength and bending ability than provided by gears and pinions of conventional design.

You can put your confidence in—

GENERAL ELECTRIC



pick up bigger payloads

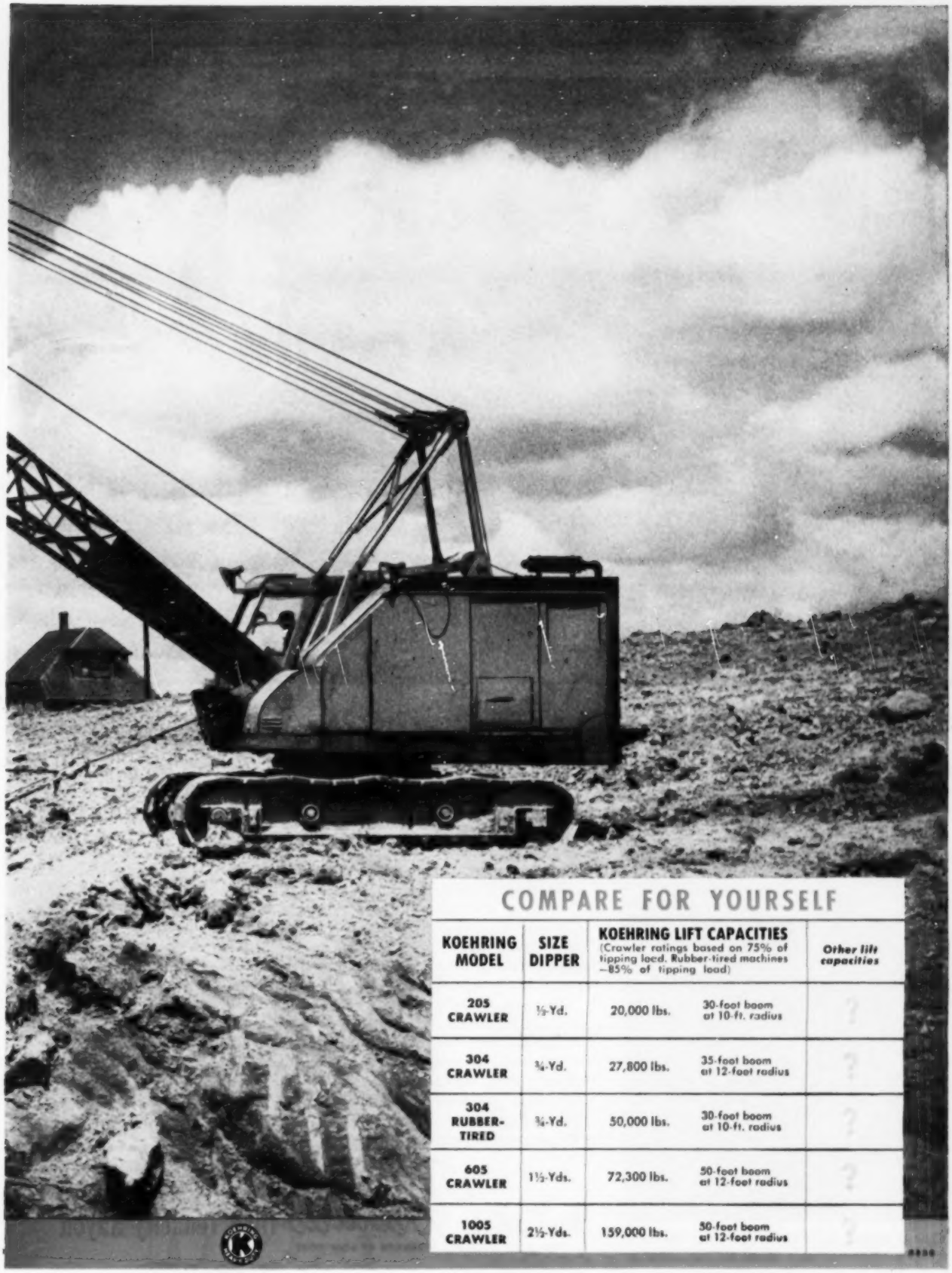
with "KOEHRING WORK CAPACITY"

Big payload performance of Koehring cranes and excavators can be measured very quickly. Take a look at lifting capacities, for instance.

Obviously, the machine with the heaviest lift capacity not only picks up larger crane loads, it also has more power and stability to increase shovel or hoe production — handles bigger dragline and clamshell buckets on a wider work range.

Check lift ratings and other clear-cut measurements of "KOEHRING WORK CAPACITY", to insure biggest payload performance on all of your jobs. See Koehring distributor for all the facts.

KOEHRING COMPANY Milwaukee 16, Wis. Subsidiaries: JOHNSON PARSONS • KWIK-MIX



COMPARE FOR YOURSELF

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines —85% of tipping load)		*Other lift capacities*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-foot radius	
304 RUBBER-TIRED	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-foot radius	
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-foot radius	

V & C Coal Corporation finds that **4,000-foot belt reinforced with "Cordura" gives trouble-free service in 8-hour-per-day operation**

View of loading point inside mine. The main belt, reinforced with Du Pont "Cordura", is loaded by feeder belts from the different cross entries where the coal is dug. It operates under low-ceiling conditions . . . with considerable dust or dampness.

The entire production of the V & C Coal Corporation's mine, at Grays Knob, Ky., depends on the performance of the main conveyor belt, shown above, which operates continuously for 8 hours per day. Produced by the Manhattan Rubber Division of Raybestos-Manhattan and sinewed for strength with Du Pont Cordura* High Tenacity Rayon, this belt has been steadily extended to reach new working areas . . . now is 4,000 feet between centers. The mine operators report that they have never had any trouble with it . . . though the belt it replaced had broken down at times while operating on 2,800-foot centers.

The high strength of Du Pont "Cordura" makes possible belting that's stronger, yet thinner, for better troughing and training. And the low stretch of "Cordura" saves costly shutdowns for take-up and resplicing.

Before you order your next conveyor belt, inquire about the use of "Cordura" rayon in belts. We'll send you the names of suppliers . . . together with full information. Just write for your free copy of "Sinews for Industry." Address: Textile Fibers Dept., Room 2520-C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

For any Lamp Handling System

. . . the EDISON R-4 ELECTRIC CAP LAMP

In Edison equipped mines across the nation, you'll find Self-Service, Modified Self-Service and Standard Service installations. These different systems, established to satisfy individual needs, provide convincing testimony that the Edison R-4 is the answer to any lamproom requirement.

SELF-SERVICE SYSTEM

MODIFIED SELF-SERVICE SYSTEM

STANDARD SERVICE SYSTEM

M.S.A. Charging Rack and Charging Control Equipment give you a compact, efficient installation. This equipment provides a central point of control for the charging cycle.

The Best Lamp Handling System is the One Best Suited to Your Needs

Because no *one* lamp handling system works best for *every* mine program, it is essential to design a method that fits into *your* particular operation.

Regardless of the system you choose, the Edison R-4 can meet your requirements. Making good on this assignment naturally calls for something extra in lamp quality and dependability. The Edison R-4 has every modern improvement that continuing research, craftsmanship and manufacture can provide. The same design and construction QUALITIES that give the Edison R-4 its brilliant, *unfailing* light underground are setting a standard for lamproom performance everywhere.

MSA

SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M.S.A. is at your service . . . Our job is to help you

MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pa.

At Your Service: 77 Branch Offices in the United States and Mexico

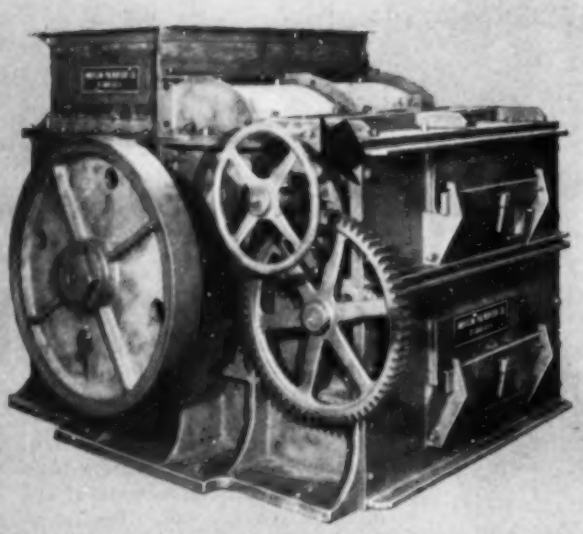
MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED

Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, New Glasgow, N.S.

Check *American* Quality—Feature by Feature—and you'll know

WHY AMERICAN CRUSHERS can reduce coal for less than

per ton



1 EASY ACCESS TO ADJUSTMENTS. Constant improvements in design over the years has produced a crusher with all adjustments *external*—and adjustable *while the crusher is in operation.*

AMERICAN Feature No. 4

COMPLETE ACCESSIBILITY TO PARTS AND ADJUSTMENTS

The entire frame of an American Crusher is of sectional design. This means easy, convenient dismantling for quick inspection or replacements in the crushing chamber. All members are securely bolted together with coupling bolts. Abutting joints are machined for a dust-tight fit. The result is a crusher designed for maximum operating efficiency, with minimum shut-down time or lost production.

2 EASY ACCESS TO PARTS. The rotor of an American Crusher, with its rows of American-Originated Rolling Shredder Rings, is readily accessible by removal of the top section. Rings can be reversed or replaced in a short time. Other parts, too, including the liners, are easily reached for periodical check.

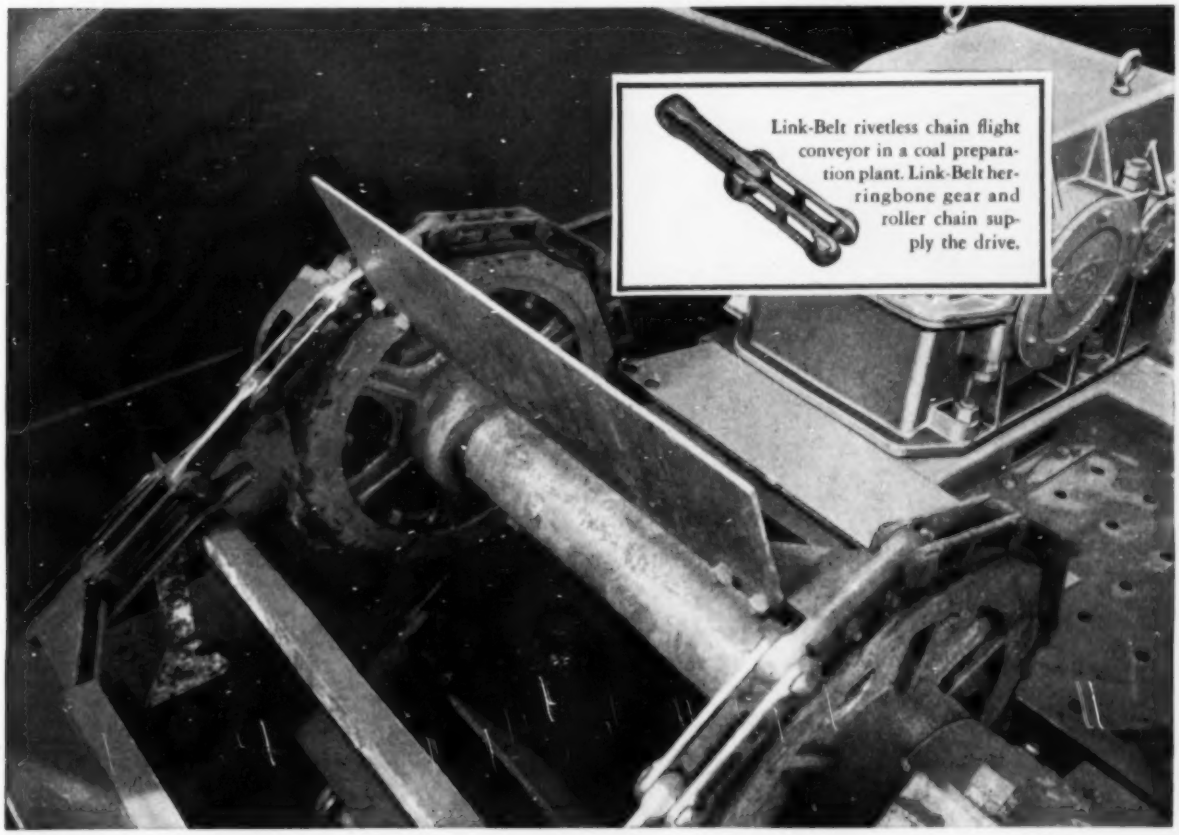
Coal Samplers
Coal Crushers up to 800 TPH.
WRITE for special bulletin.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE. • SAINT LOUIS 10, MO.

Is there ONE chain that best meets your drive or conveyor problem?



Link-Belt rivetless chain flight conveyor in a coal preparation plant. Link-Belt herringbone gear and roller chain supply the drive.

You'll find the answer in LINK-BELT's complete chain line... a size and type for every job

The application shown above is an example of how you can select the *one* chain best suited for a particular need from the complete Link-Belt line. And each chain is engineered to provide more efficient service at lower cost than so-called general purpose chain.

Whatever your requirements, you are assured of the *right* chain for the job when you rely on Link-Belt. And, remember—a chain bearing the Link-Belt double >—< arrow is your guarantee of longer chain life.

For information on the complete Link-Belt chain line, see the Link-Belt representative near you. He has the answers for efficient, low-cost drive and conveying chain performance.

LINK-BELT

CHAINS AND SPROCKETS

Typical chains from the complete LINK-BELT line

Ewart Detachable Link-Belt—A widely used, popular chain for average or normal-duty service on conveyors, elevators and drives.

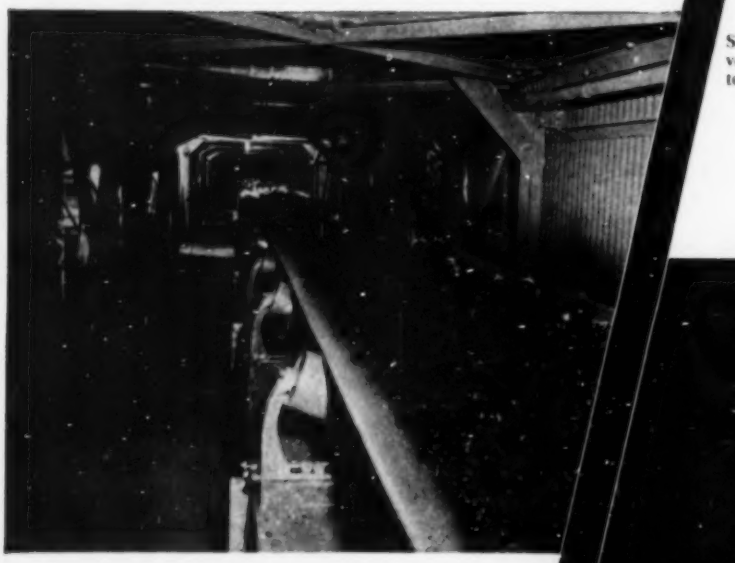
Class 400 Pintle Chain—Closed end design keeps out dirt, makes excellent service medium for drives, elevators, conveyors.

Class 1100 Roller Chain—For rolling conveyors and inclined rolling elevators operating under normal conditions.

Link-Belt Precision Steel Roller Chain, standard pitch, for high-speed drives or conveyors.

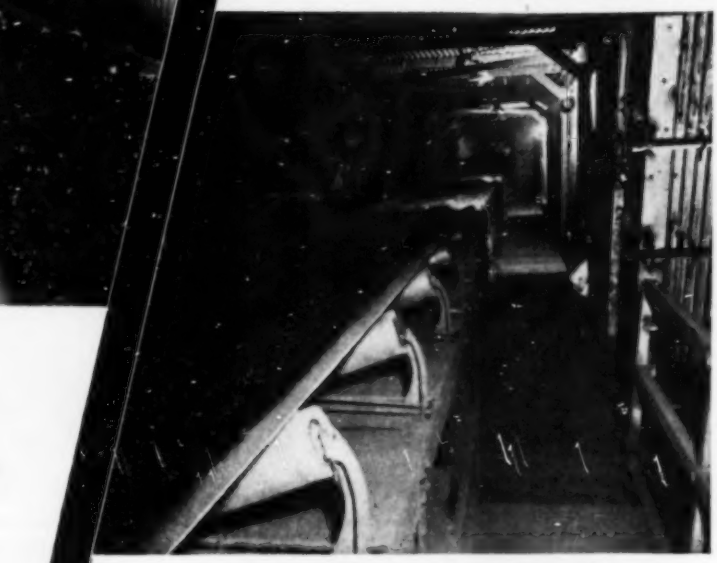
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,101

Coal preparation—with the help of U. S. Rubber



Section of U.S. Giant® Conveyor Belt delivering raw coal to cleaning plant.

About two million tons of coal go through this plant in a year.



Ridding coal of impurities is an exacting job—especially when the coal preparation plant is geared to handle 750 tons per hour or about two million tons per year of 7 accurate sizes. When a West Virginia plant was faced with this production quota, United States Rubber Company conveyor belts, 11 in all, were specified—to insure top output with minimum cost and trouble.

Your own belt problem may be run-of-the-mill or absolutely unique. Whatever it is, hand it over to "U.S." engineers. They are stationed in 25 strategically located district sales offices. Write to address below.

This plant uses another "U.S." product—Pilot® Flexible Pipe that carries a mixture of magnetite and water in the preparation plant, guards equipment from the effects of vibration, expansion and contraction.

U.S. RUBBER
SERVING THROUGH SCIENCE

"U.S." Research perfects it.
"U.S." Production builds it.
U.S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

What's your problem?

H. Dillingham of Standard Oil's Evansville, Indiana, office, helped this midwest mine use SUPERLA Mine Lubricants to good advantage. He was close at hand, gave operators engineering service when they needed it.

There's a corps of Standard Oil lubrication specialists throughout the Midwest. You'll find one located near your mine. Through special training and a lot of practical experience, this man has gained a working knowledge of lubrication that can mean real savings for you. To obtain his services, simply contact the nearest Standard Oil office. Discuss with him the savings you can make with such outstanding products as:

STANOIL Industrial Oils...Here's one line of oils that provides cleaner operation of loader and crane hydraulic units; supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants . . . On open gears and wire ropes, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

Here's versatile lubrication, plus!

• At a midwest mine, two grades of SUPERLA Mine Lubricants not only have handled successfully a wide variety of jobs but have proved superior in each application to special products previously used.

SUPERLA Mine Lubricant No. 00 has served for over three years in the gear cases and hydraulics of the mine's loaders. Despite hard operation of these machines, there have been no clutch failures, and clutch plates have remained free from carbon deposits. There have been no bearing failures. Hydraulic units have operated efficiently with no downtime for maintenance.

SUPERLA Mine Lubricant No. 4 has been used for over three years in loader gathering heads. On this punishing job, it has prevented any trouble caused by lubricant deterioration or breakdown. Bearing wear has been kept to a minimum.

Shuttle car lubrication and service in a roof bolting drill are among the uses of SUPERLA Mine Lubricants in this mine. The versatility of these products has simplified lubrication and the stocking of lubricants. It has eliminated the costly use of special-purpose oils and greases.

SUPERLA
REG. U. S. PAT. OFF.
Mine Lubricants

You'll find among the six grades of SUPERLA Mine Lubricants the right combination for successful lubrication of your loaders, cutting machines, shuttle cars, and related equipment. The Standard Oil lubrication specialist in your section of the Midwest will help you get the best possible results. You can contact him through your local Standard Oil Company (Indiana) office. Or write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

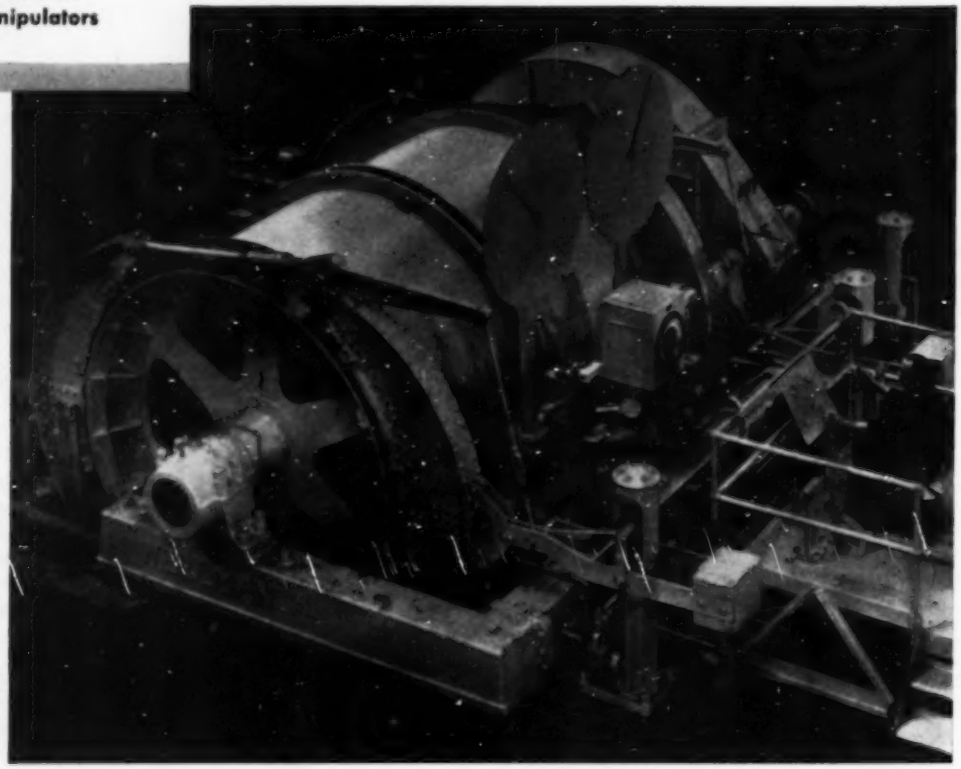
STANDARD OIL COMPANY **STANDARD** *(Indiana)*

Wellman will build it

Special Cranes
Mine Hoists
Car Dumpers
Gas Producer Plants
Ore Bridges
Charging Machines
Gas Flue Systems
Gas Reversing Valves
Coke Pushers
Skip Hoists
Clamshell Buckets
Forging Manipulators

Wellman electric mine hoists

give dependable performance all over the world



Wellman 10' x 4' 11" Double Drum Geared Electric Mine Hoist with 7' axial plate clutch and 10' Parallel Acting Brakes. Rated rope pull: 22,000 lbs.

● For more than half a century, in mines all over the world, Wellman Electric Mine Hoists have been used because they combine expert design with expert construction . . . featuring all the "modern improvements" developed in our many years' experience. Wellman Mine Hoists provide maximum safety, peak economy, and trouble-free operation under a wide variety of conditions. Let us give you recommendations for hoists that will do your job most satisfactorily.

THE WELLMAN ENGINEERING COMPANY

7000 CENTRAL AVENUE • CLEVELAND 4, OHIO

Advance design features make Allis-Chalmers Tractors performance leaders

It takes truly modern equipment to keep pace with today's stepped-up demands — and do it at an operating cost which insures fair and consistent profits. The line of Allis-Chalmers crawler tractors has been designed and built completely new since the war, with the kind of advanced engineering that delivers big-capacity performance at a minimum of maintenance expense.

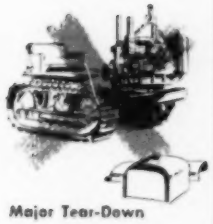
This forward progress is a continuing program. Additional improvements are constantly being incorporated into the HD-5, HD-9, HD-15 and HD-20 tractors. If you are in the market or just interested, see your Allis-Chalmers dealer for all the inside facts that have proved so popular with owners as well as operators and mechanics.

Daily Lubrication

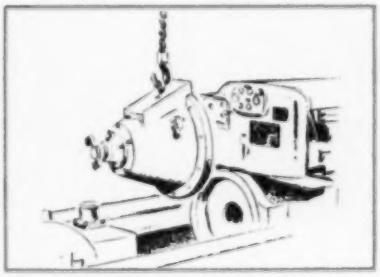
1000-hour Lubrication. Operate six months on a 40-hour week basis with just one lubrication of truck wheels, front idlers and support rollers. Positive seals protect from dust, loose sand, soft ground, mud or water. You gain working time, save labor and lubricant costs, eliminate costly damage from greasing neglect.

Ordinary Steering Clutches

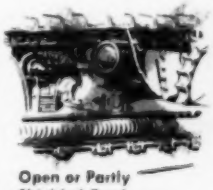
Hydraulic Steering and Self-Energizing Brakes. The HD-15 and HD-20 have hydraulic booster steering; operator exerts only 3 to 5 lb. pressure on controls, so he gets small tractor maneuverability from these 27,850 and 41,000 crawlers. Self-energizing brakes need less pedal pressure, take hold with a firm, uniform grip.



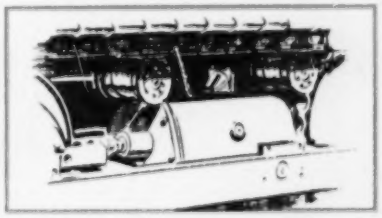
Major Tear-Down



Unit Servicing. No need to remove transmission or engine, radiator, grille, etc., when servicing or removing an Allis-Chalmers master clutch. The unit assembly principle also applies to final drive gear, transmission, steering clutches, engine and truck frame. Save hours of costly service and down time.

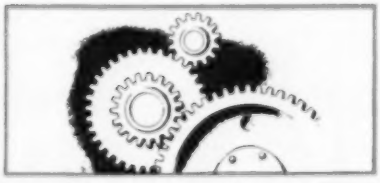


Open or Partly Shielded Track Release Mechanism

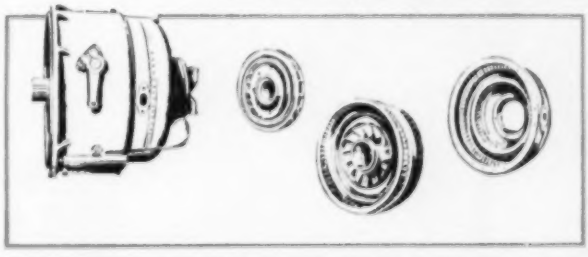


Oil Enclosed Track Release Mechanism. Operating in oil and *sealed* against dirt and moisture, Allis-Chalmers track release mechanism seals out mud, ice and debris. Because it's completely sealed, release mechanism is in working condition at all times — providing positive protection when obstacles jam into the tracks.

Single Reduction Final Drive



Double Reduction Final Drive. With smaller gears and shorter shafts, double reduction final drives provide better bearing and gear alignment. The "live" axle permits smaller, more serviceable seals. Equally important, double reduction drive provides for smooth, clean bottom construction and the extra ground clearance so necessary on rough terrain.



Hydraulic Torque Converter Drive. The HD-20 is the only crawler tractor where torque converter is standard equipment and part of the basic design. Torque converter gives greater pay load capacity because this unit automatically balances travel speed to the load. And with most shifting eliminated, there's far less operator fatigue.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

ORIGINATOR OF THE TORQUE CONVERTER TRACTOR

ROLLWAY Bronze-Retainer Roller Bearings

From 30" O.D. to 3" O.D.!

Regardless of size—regardless of type, radial or thrust—Rollway Roller Bearings roll right because they're made *right*. Net result of Rollway's precision "right angle design" is longer bearing service—under heavier loads—with lower maintenance cost.

RIGHT ANGLE Roller ends precisely square to avoid end-rub, oscillation and side-thrust.
RIGHT ANGLE Bearing surfaces with correct allotism that results in correct wave-free right-line rolling.
RIGHT ANGLE Generator plate accurately machined to prevent roller skew, slide and uneven wear.

● Our complete engineering and metallurgical services will gladly work with you on your problems. Simply write or wire any sales office. No cost. No obligation. Rollway Bearing Co., Inc., Syracuse 4, N. Y.

Rollway Bearing replacements are available through authorized bearing distributors in principal cities. Consult your classified 'phone directory.

SALES OFFICES

Syracuse Cleveland Houston Boston Philadelphia Chicago
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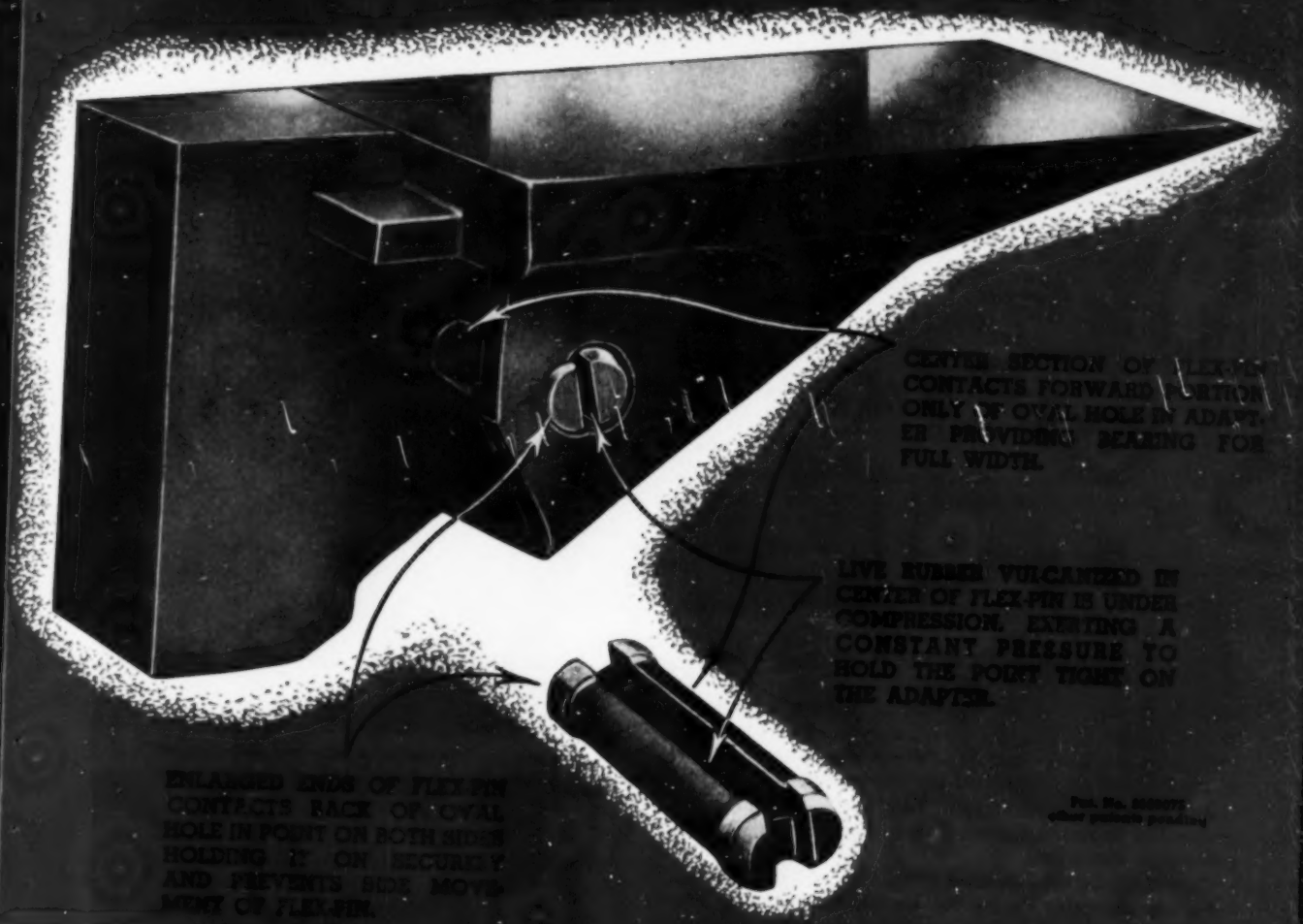
ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

REDUCE YOUR COST WITH

....Teeth that really Dig!

Positive Locking FLEX-PIN CONNECTION

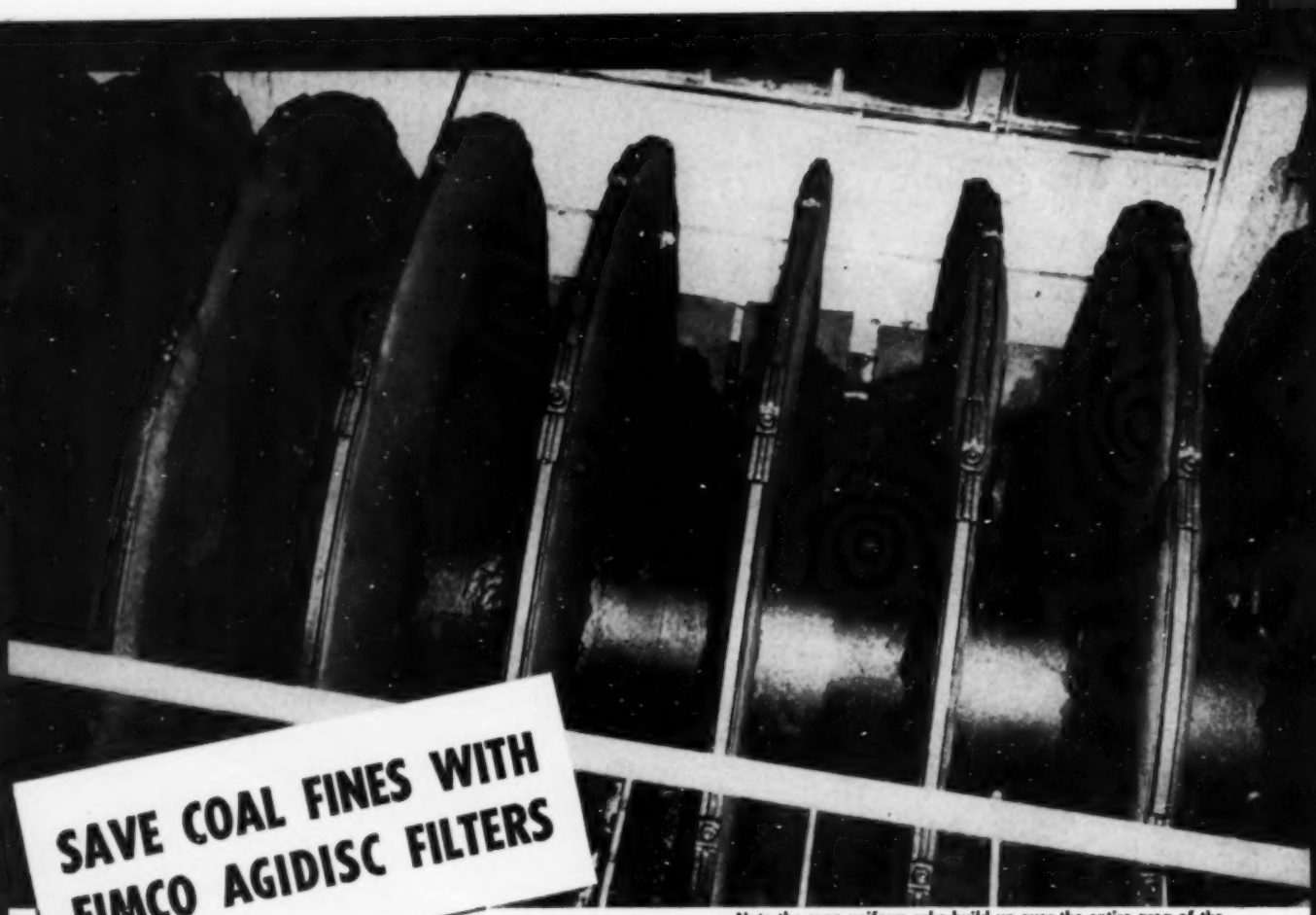

CENTER SECTION OF FLEX-PIN CONTACTS FORWARD PORTION ONLY OF OVAL HOLE IN ADAPTER PROVIDING BEARING FOR FULL WIDTH.
LIVE RUBBER VULCANIZED IN CENTER OF FLEX-PIN IS UNDER COMPRESSION, EXERTING A CONSTANT PRESSURE TO HOLD THE POINT TIGHT ON THE ADAPTER.
ENLARGED ENDS OF FLEX-PIN CONTACTS RACE OF OVAL HOLE IN POINT ON BOTH SIDES HOLDING IT ON SECURELY AND PREVENTS SIDE MOVEMENT OF FLEX-PIN.

H&L

TOOTH COMPANY

(Pioneer Manufacturers of Two-Part Teeth)

1542 SO. GREENWOOD AVE. MONTEBELLO, CALIFORNIA



SAVE COAL FINES WITH EIMCO AGIDISC FILTERS

Coal Fines can be saved at a profit. Many companies are installing Eimco Agidisc Filters with the following results:

1. Reduced moisture content of fine coal.
2. Clean, clear filtrate.
3. Uniform cake distribution over entire surface of disc sector.
4. Greater tonnage dewatered per square foot of filter area.
5. Greater profits from sale of reclaimed fines.

Eimco Agidisc filters are heavy-duty machines built for continuous 24 hour operation. They require a minimum of mechanical attention and are absolutely dependable.

More than half a century of service to the mining and processing industries gives Eimco the necessary background to serve you.

Coal samples may be sent to our laboratories for free filtration analysis. Write for instructions for shipping samples.

Note the even uniform cake build up over the entire area of the disc—no gobs or bumps on the outside periphery of the sectors.

This cake has less moisture content and discharges easily

EIMCO A465

THE EIMCO CORPORATION

The World's Leading Manufacturer of Vacuum Filtration Equipment

EXECUTIVE OFFICES AND FACTORIES: SALT LAKE CITY 10, UTAH, U. S. A.

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Wire rope? What's that got to do with us?

WICKWIRE ROPE — A CF&I PRODUCT

A lot more than you might think, folks. Consider, for example, the heating in your home . . . the warmth that keeps *her* snug and comfortable through a wintry night. Whether you use coal, oil or gas—wire rope is an indispensable part of the equipment that probes the earth's depths to bring this comfort to you. Chances are, it may be Wickwire Rope. Because for over half a century Wickwire Rope has been an outstanding favorite with men in the mining and petroleum industries. Like users in numerous other lines of business, these men know that for unfailing performance, longer life and more economical service—there's nothing to match the quality and care that go into the making of WICKWIRE ROPE.

A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver
Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland
Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga
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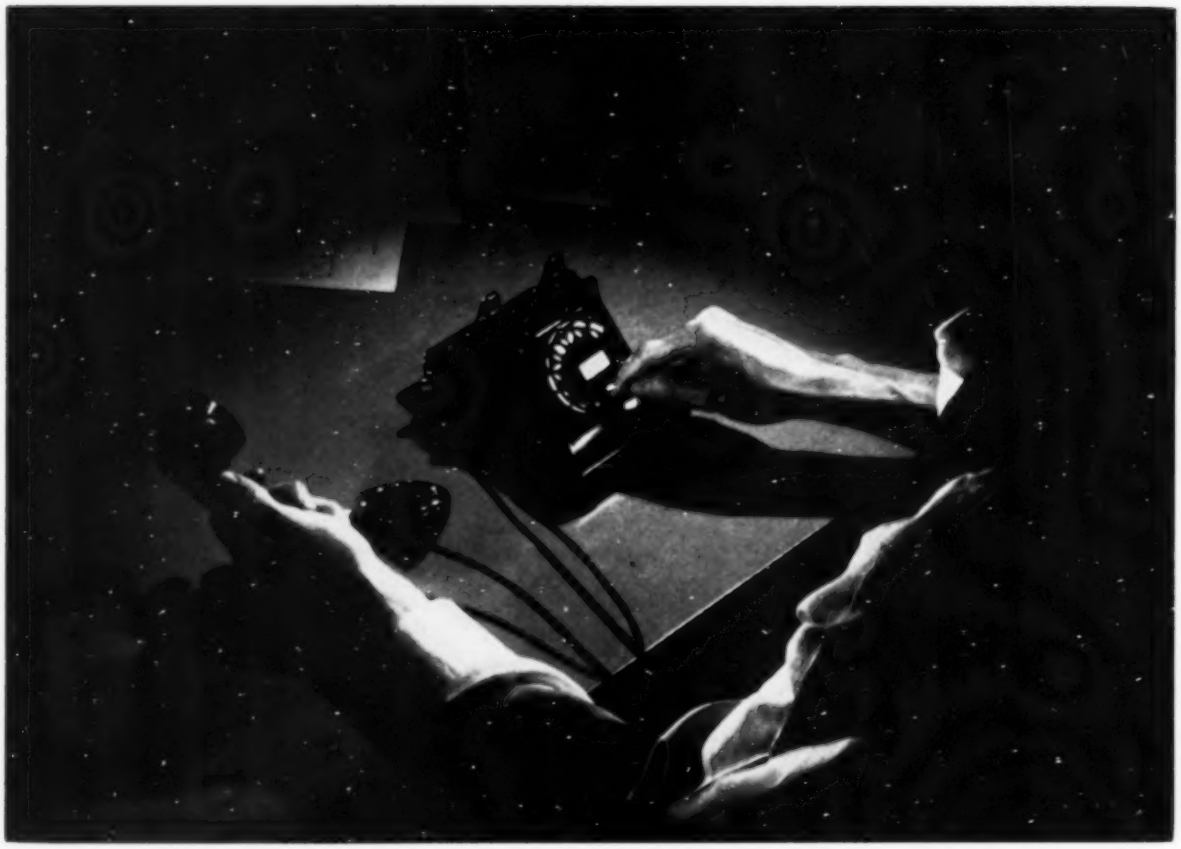
1792

WICKWIRE ROPE
CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION



HERE'S ONE WAY TO HANDLE YOUR COAL PREPARATION PROBLEMS

Phone R&S

Tired of working late on coal preparation problems? Wondering what kind of new preparation equipment or plant you need? Or are you stumped by the problem of modernizing an existing plant? Whatever your coal preparation problem, there is a simple, practical solution—just call R&S.

When you call R&S you'll be in touch with coal preparation specialists — a complete engineering, fabrication and construction service—famous for new ideas, backed by a fifty-year record of results.

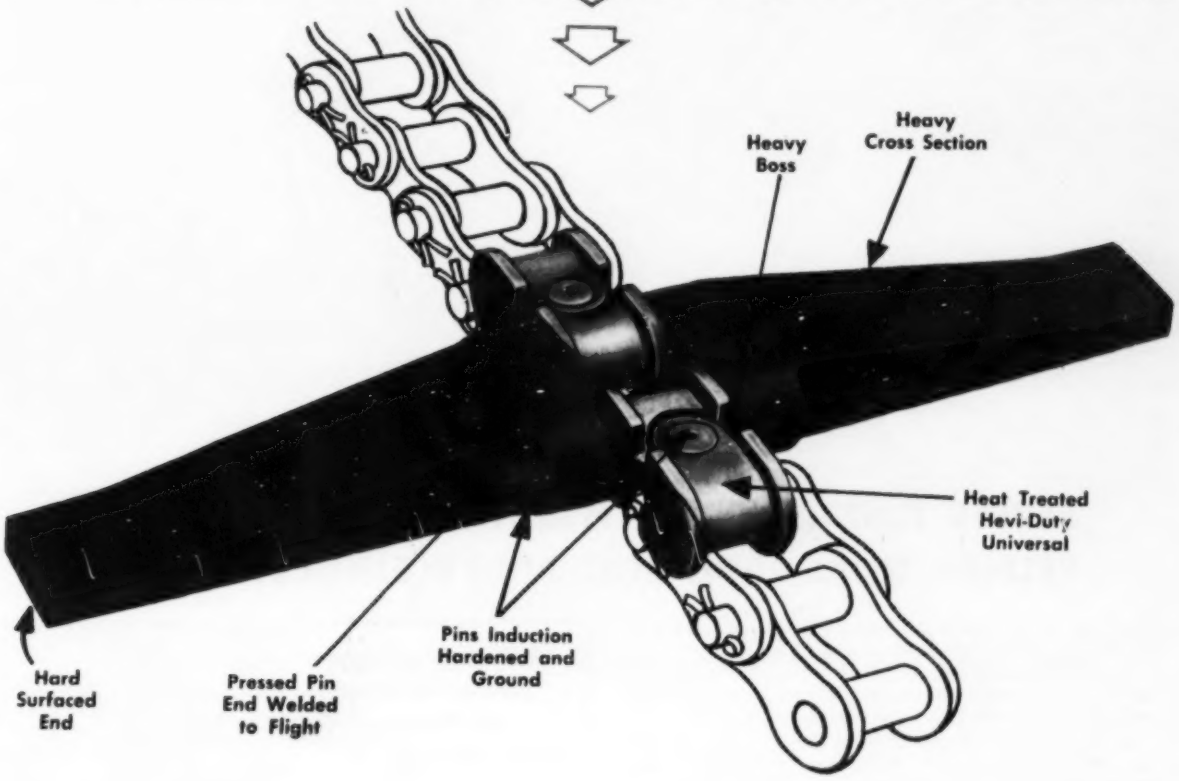
What's *your* coal preparation problem? Use this simple approach to a solution: Call the R&S office nearest you—collect.

ROBERTS & SCHAEFER CO.

130 North Wells Street, Chicago 6, Ill.
Phone CEntral 6-7292
BIRMINGHAM 8, ALA., Phone 58-6341
HUNTINGTON, W. VA., Phone 34272 or 8878
NEW YORK 19, N. Y., Phone PLaza 7-5017
PITTSBURGH 22, PA., Phone ATlantic 1-8608

Redbird
Replacement Flight Chains for GOODMAN LOADERS

TYPES 460-660-665



REDUCE "ON THE JOB" REPAIR INTERRUPTIONS

Get the facts for your loaders and conveyors now.

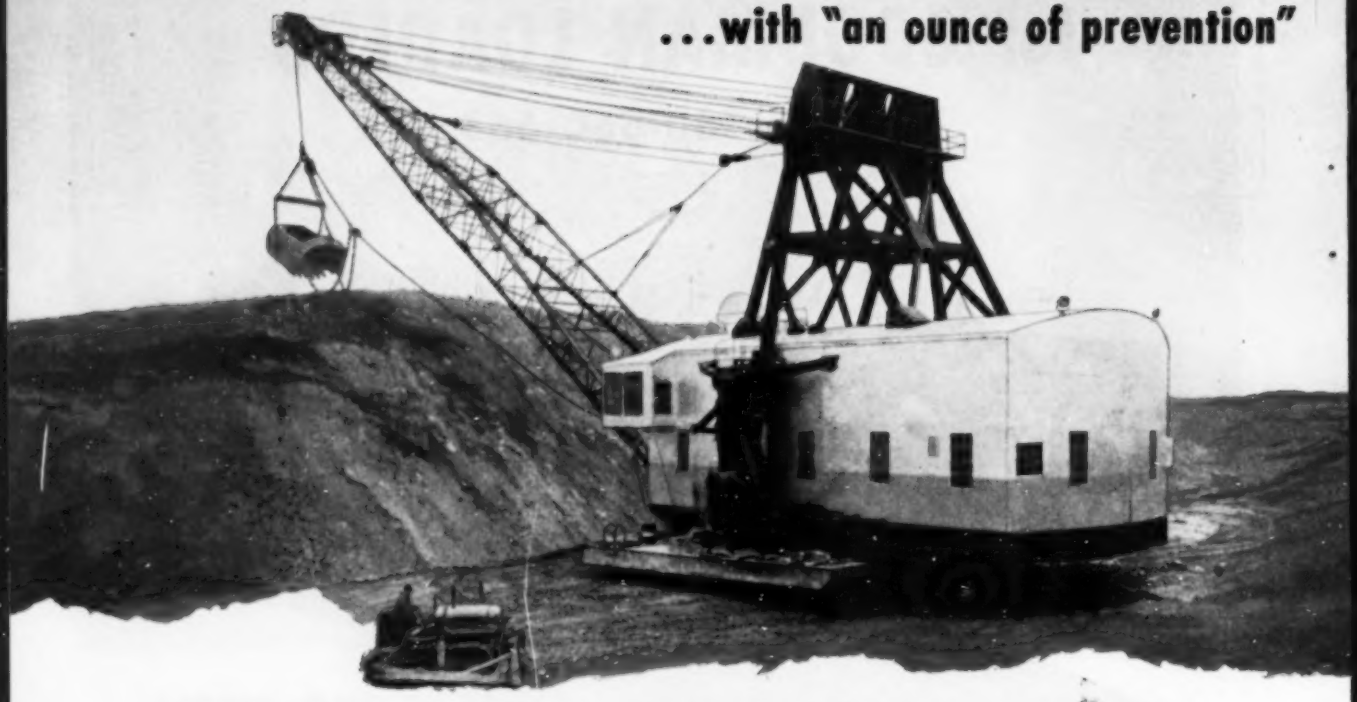
Clarkson Manufacturing Co.

Nashville, Illinois

Another Alemite "FRICTION FIGHTERS" Achievement!

Soothing a 1600 Ton Giant

...with "an ounce of prevention"



SAVING TIME...WORK...MONEY...BOOSTING TONNAGE!
HELPING VITAL EQUIPMENT PRODUCE MORE...LONGER!

Amazing how the giants of industry can be kept running at top efficiency by modern lubrication methods.

No rest for this giant dragline. 24 hours a day it depends on safe, sure Alemite lubrication. Delivers greater tonnage—at minimum cost—with down-time cut to the bone.

Alemite "Friction Fighters" bring the protection of safe, sure lubrication to trucks, tractors—any equipment—right on the job. Under the toughest job conditions where grit and dirt threaten bearings at every turn Alemite protects vital equipment, keeps it producing at top efficiency year after year—at less cost!

Alemite Protects with Safe, Clean Lubrication Faster!
Above ground or below ground there is Alemite equipment to bring efficiency to the essential job of lubrication—transferring, loading or applying oil or grease. And Alemite delivers the lubricant "refinery clean" from barrel to bearing. You save time—work—money!

Alemite Reduces Down-Time—Ups Production!
Alemite lubrication methods save man hours, reduce wasted machine time by serving the machine on the job without shutdown. Tonnage goes up, costs go down! Find out how Alemite "Friction Fighters" can work for you, prolonging machine life, saving time, lowering costs per ton.

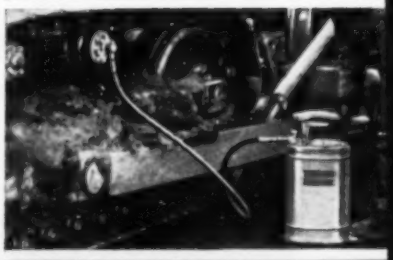
ALEMITE

A PRODUCT OF SW STEWART-WARNER

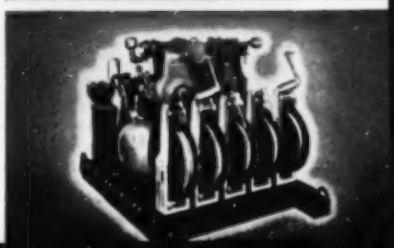
Lubrication Methods that Cut Maintenance Costs

Here Are Three Ways "Friction Fighters" Can Help You!

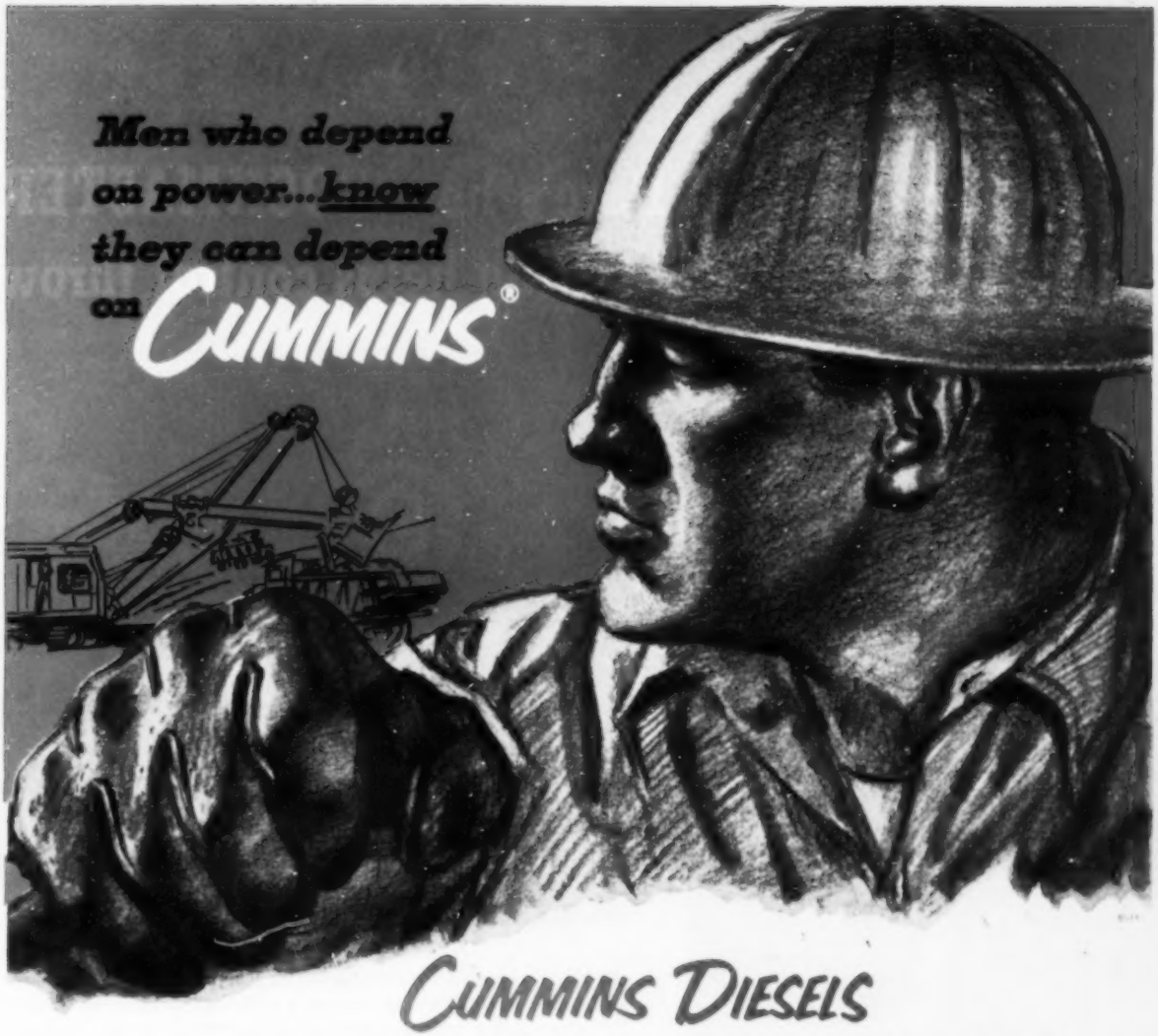
Dragline Lubrication—Here is the roller track that carries the massive weight of the dragline, and supports the pull of the tremendous boom, being lubricated with a Model 7137-A "Red-A" Alemite Bucket Pump. Develops 5,000 pounds pressure, provides volume delivery.



Where the going is rugged—You find Alemite lubrication at its best. Here a big volume Alemite Tractor Bucket Pump, Model 6521-B, is used to lubricate the track support rollers of a bulldozer. Delivers lubricant fresh and clean from 35 lb. cap. tank with 3,000 lbs. pressure.



Alemite Portable Service Station—Built to mount on a truck bed, this unit brings lubricants and equipment right to the machine. Air-powered, with famous Alemite "Atomic" pumps, it delivers direct from original 100-pound drums. Sectionalized to fit your specific needs.



CUMMINS DIESELS

are engineered to make light work of tough jobs

Write for

FREE

informative booklet

"The Dependable Diesel"

demonstrating Cummins' performance in all power jobs.

You know it pays to hire the most experienced worker. In the field of rugged, lightweight, high-speed diesels, Cummins has logged more *pioneering* time than any other engine maker.

Yes, Cummins ranks as the leader in boosting diesel power, flexibility and stamina . . . reducing dead weight and bulk. The result: engines that are *tough* yet *mobile!* The story of the modern lightweight, high-speed diesel is the story of Cummins. Today, as in the past, Cummins sets the pace . . . works continuously to produce diesel engines that get more work done at lower cost, that outperform all others on every job.

Find out what a Cummins Diesel (60-600 h.p.) can do in your operations. Your Cummins dealer is ready to give you *all the facts.* Call him today.

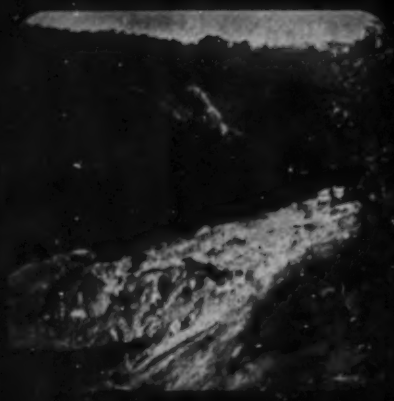
Leaders in rugged, lightweight high-speed diesel power!

CUMMINS

CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana
Export: Cummins Diesel Export Corporation
Columbus, Indiana, U.S.A. Cable: CUMDIEX

the inside story

Here's how ROCKMASTER blasting helps control throw



Holes loaded and ready to shoot.

Peak of blast. Confinement is good.

Spent gases appear . . . air blast avoided.

Well placed final pile. Throw controlled.

THIS blast area on By-pass Route 22, Easton, Pa., was adjacent to gasoline storage tanks, homes, a parking lot, business establishments and a precision instrument factory. It was a ticklish blasting problem for Central Pennsylvania Quarry, Stripping and Construction Co., contractors on the job. Absolute control was a "must." Flying rocks had to be minimized . . . along with noise and vibration.

The ROCKMASTER pattern illustrated above was designed to keep blasted material from falling down the slope. The holes were carefully loaded and adequately stemmed. As the blast was fired, it advanced in alternate delay periods from ROCKMASTER No. 1 to No. 6. The row toward the slope fired first and gave relief for subsequent rows. The general heave inclined toward this relief—up the slope.

When you have shooting problems like this, ROCKMASTER can help you too. Send for your copy of the ROCKMASTER Blasting System Booklet.

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

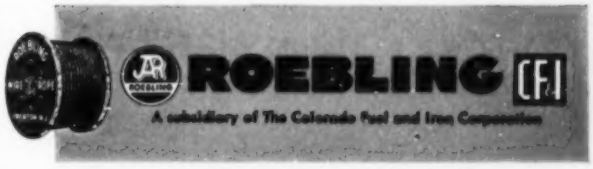
ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

Offices in principal cities

"There's only ONE reason!"

IT'S JUST THAT SIMPLE. There's only one reason in the world why so many wire rope users in the mining field prefer Roebling wire rope... *it costs a lot less on the job than any other.*

For maximum wire rope efficiency and economy, call your nearest Roebling office for a Field Man. He'll recommend the best ropes for your requirements.



JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4501 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

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Keep your weights a matter of record

Automatically!

Rule out the chance for weighing errors with a Fairbanks-Morse Dial Scale with Printomatic Recorder. You save annoying, costly receiving and shipping disputes — you have a permanent record of each article weighed *automatically!*

The Printomatic is designed so that other pertinent information may also be printed with the weight for accounting or identification purposes. And, there's an electronic control for materials handling and processing.

See your local Fairbanks-Morse Scale Specialist about the Printomatic Recorder . . . and his complete line of scales of all types. Fairbanks, Morse & Co., Chicago 5, Illinois.

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a name worth remembering when you want the best

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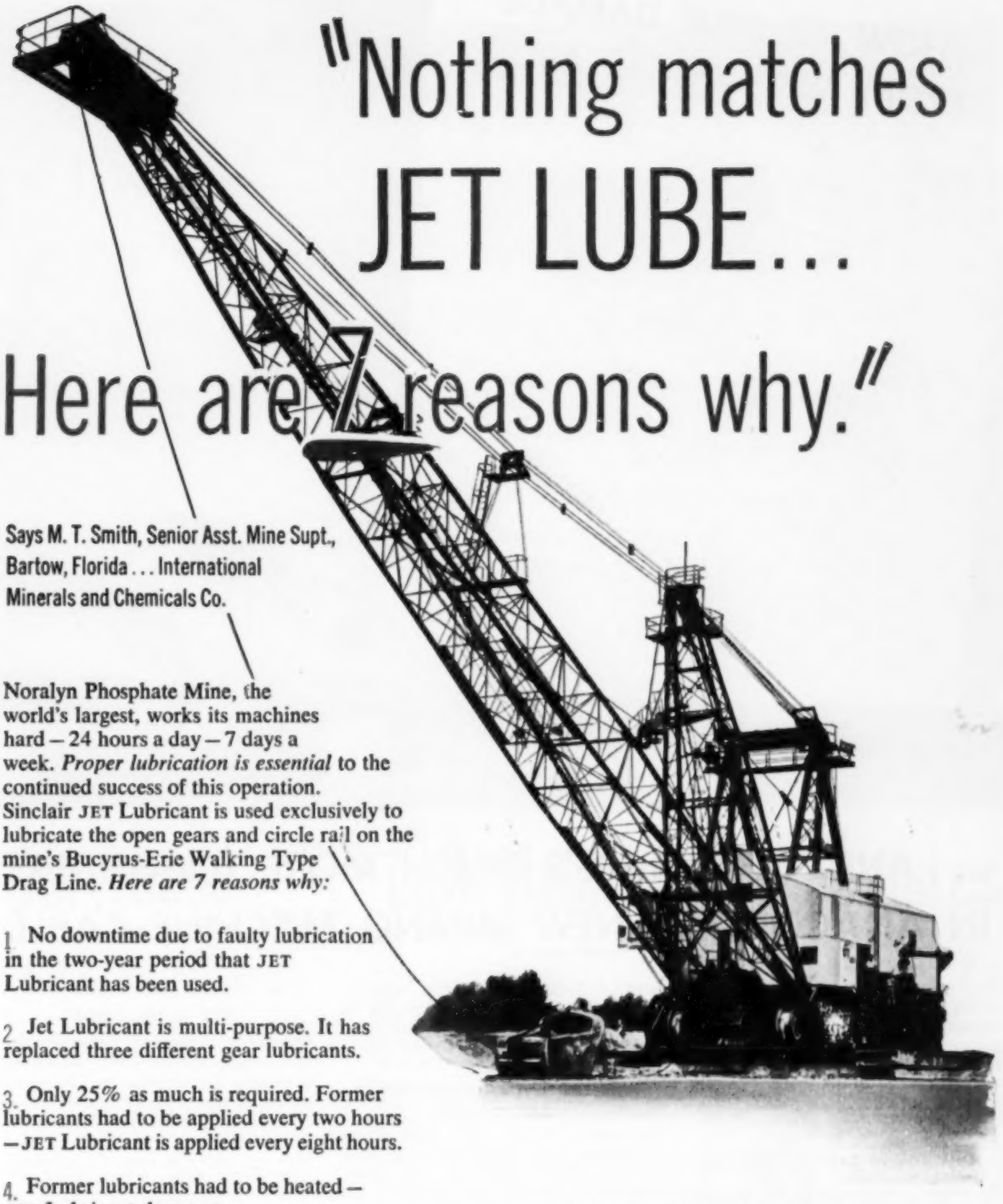
"Nothing matches JET LUBE... Here are 7 reasons why."



Says M. T. Smith, Senior Asst. Mine Supt., Bartow, Florida... International Minerals and Chemicals Co.

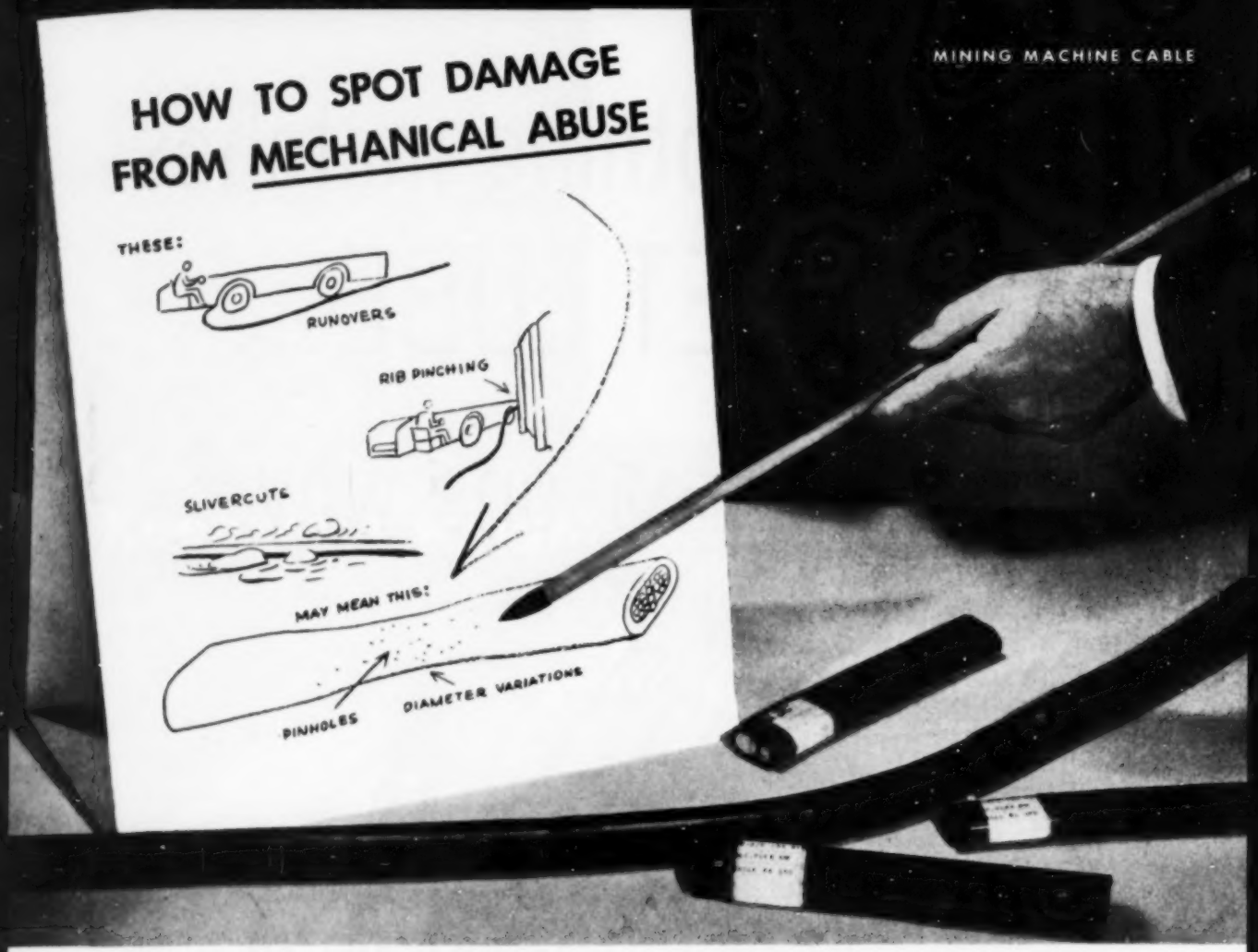
Noralyn Phosphate Mine, the world's largest, works its machines hard – 24 hours a day – 7 days a week. *Proper lubrication is essential* to the continued success of this operation. Sinclair JET Lubricant is used exclusively to lubricate the open gears and circle rail on the mine's Bucyrus-Erie Walking Type Drag Line. *Here are 7 reasons why:*

1. No downtime due to faulty lubrication in the two-year period that JET Lubricant has been used.
2. Jet Lubricant is multi-purpose. It has replaced three different gear lubricants.
3. Only 25% as much is required. Former lubricants had to be applied every two hours – JET Lubricant is applied every eight hours.
4. Former lubricants had to be heated – JET Lubricant does not.
5. JET Lubricant doesn't harden – former lubricants had to be scraped off during shutdowns.
6. JET Lubricant reduces inventory.
7. JET Lubricant eliminates any chance of misapplication.

●There are *more* reasons why the right grade of JET Lubricant and other Sinclair products can improve your operations. Why not phone or write the nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

MINING MACHINE CABLE



. . . AND WHY THERE'S MUCH MORE TOUGHNESS IN ANACONDA'S NEW MINING MACHINE CABLE

Your naked eye can't spot diameter differences in new cables. That's why it's important to check promptly when you *do* see variations in cable after it's been used. It has probably been crushed . . . by runovers or rib-pinching. Compression cuts may let in moisture *to shorten cable life.*

HOW TOUGH SHOULD CABLE BE?

As tough as we can make it—regardless of cost. One break in a cheap cable costs more than you can save by buying on price. The new ANACONDA Cables mean lower costs to you because they can take much more abuse. In fifteen mines recently surveyed, the average life of ANACONDA Cables on shuttle cars jumped 300% over cables used only a few years ago.

WHY THE NEW ANACONDA CABLES LAST LONGER

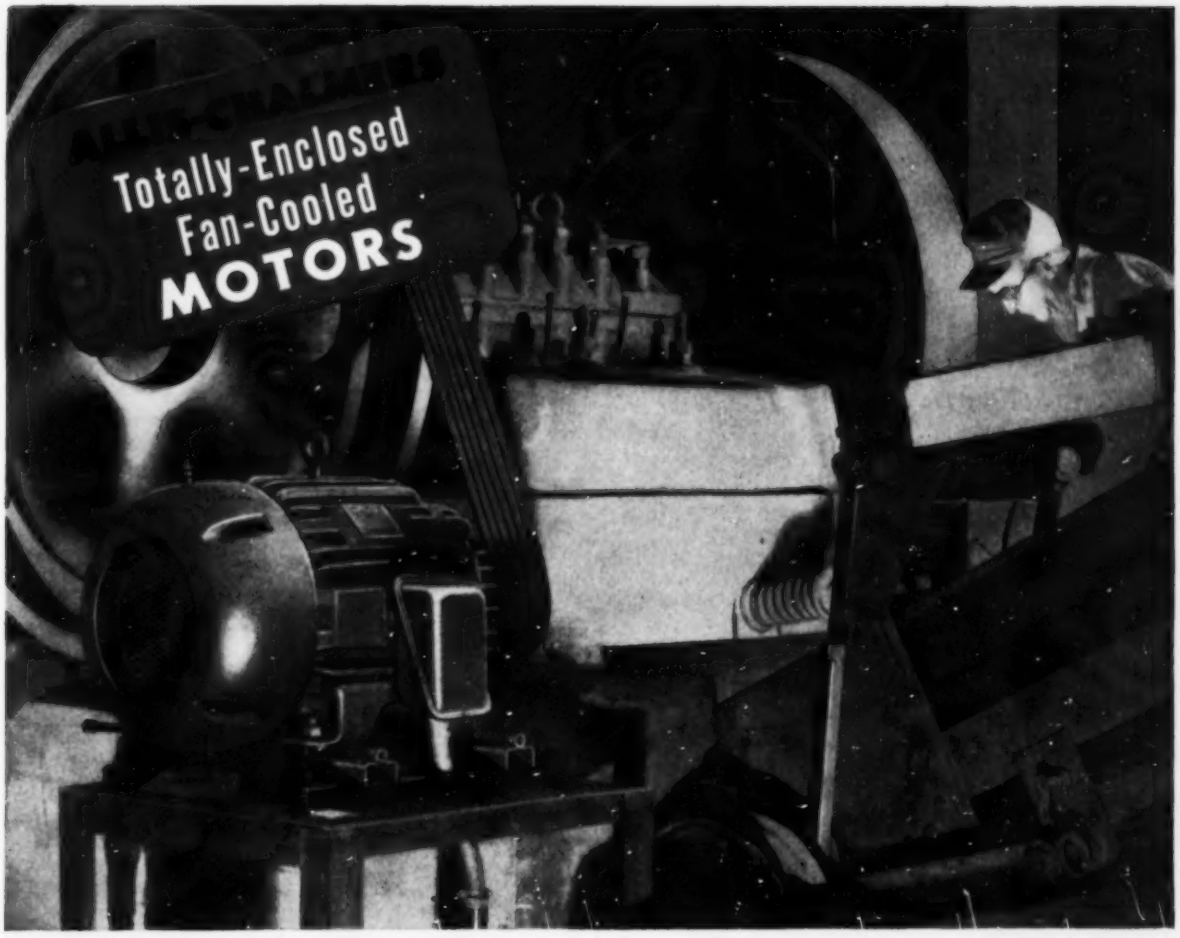
A stronger jacket, made from a new neoprene compound, resists heat, flame and moisture better. In wet mines, sliver-cuts that may cause shocks are less likely to occur. A new cold-rubber insulation means new toughness. Moisture-wise and puncture-wise both. A new type of stranding improves the flexibility of these cables under stress.

YOU BE THE JUDGE

Examine an ANACONDA Cable. See why these things are so. Call your nearest Anaconda Sales Office or Distributor for a sample. And remember: no ANACONDA Cable has ever failed a U. S. Bureau of Mines flame-test. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE



Get These 3 Low Maintenance Features

1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

3 Pre-lubricated Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

GET COMPLETE INFORMATION on Allis-Chalmers motors for indoor and outdoor service — complete with Allis-Chalmers coordinated control — from your nearby A-C Authorized Distributor or District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

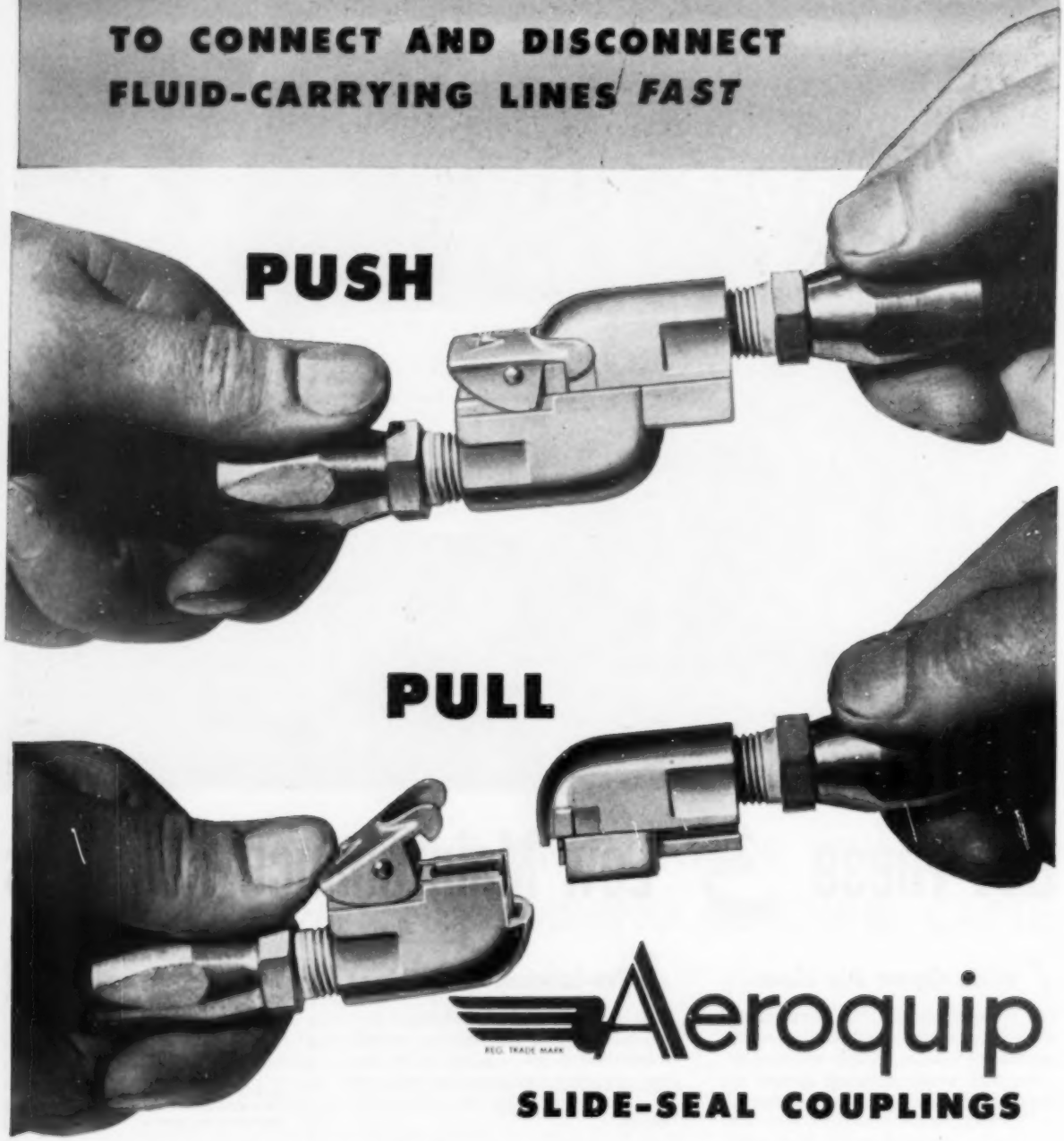
TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

A-4038

TO CONNECT AND DISCONNECT FLUID-CARRYING LINES *FAST*



Aeroquip
REG. TRADE MARK

SLIDE-SEAL COUPLINGS

This Aeroquip development saves you time and money!

LOW COST . . . Aeroquip Slide-Seal Couplings connect and disconnect fluid-carrying lines instantly assuring full flow of fluids when connected, and perfect seal of each half when disconnected.

LIGHTWEIGHT AND COMPACT . . . They are ideal for use in confined areas and may be used to advantage in a wide variety of applications.

SIMPLE DESIGN . . . Only four working parts and two "O" rings assure positive performance and foolproof operation.

ADAPTABLE for use with many fluids including hydraulic fluids, hot oil, crude and fuel oils, anti-freeze solutions, gasoline, Diesel fuels, air, water, and other fluids.

Descriptive literature is available . . . please write.

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you'll want this catalog on Self-Priming Centrifugal Pumps

IT'S FREE!

Here's a new catalog you'll surely want. It gives you all the details on Rex Speed Primer Pumps for mining use. Rex offers a complete line of self-priming centrifugal mining pumps in capacities ranging from 4,000 gallons per hour to 90,000 gallons per hour. There are gasoline-powered pumps, electric motor driven pumps and pumps without power arranged for belt drive.

You'll find complete specifications, application information, details on construction and operation plus many interesting application photos. You'll learn why—when it comes to mining pumps—your best buy is Rex. Just mail the coupon.

Chain Belt Company
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Gentlemen: Please send me Bulletin 53-37 on Rex Speed Primers.

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Company.....

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CHAIN BELT COMPANY REX SPEED PRIMER PUMPS

Use "RUFLOK"

Illustrates application of "RUFLOK" by means of a spray gun.

(Approved by Penna. Dept. of Mines)

For sealing mine roofs against scaling and spalling during the hot summer months and for many other uses.

1. "RUFLOK" is an especially prepared coating developed by Joseph Woodwell Company that seals roofs against scaling and spalling.
2. It is prepared for application by means of air spray equipment.
3. For over two years actual application in various mines has proved it to be the most effective and economical product of its kind costing but a few cents per square foot including material and labor.

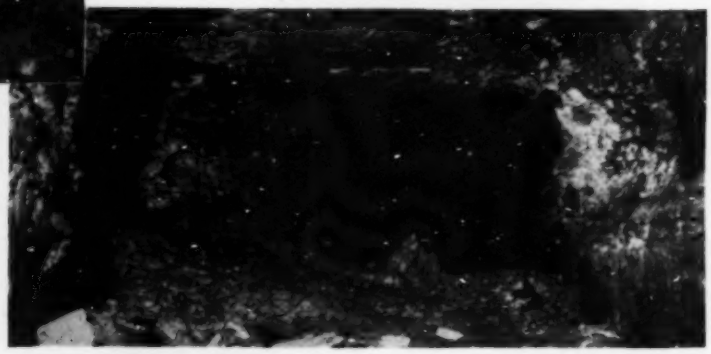
WE SHALL BE GLAD TO SEND YOU A LIST OF MINES WHO HAVE HAD THIS PRODUCT IN USE FOR OVER TWO YEARS.

"RUFLOK" is ideally suited to the following applications:

- To seal mine roofs to prevent spalling of rock and slate.
- To prevent crumbling of ribs along haulage-ways where grading has been done.
- To seal cement block stoppings and overcasts.
- To seal temporary brattice cloth stoppings and airways.

"RUFLOK" can be used on cement block, brick, rock, steel and wood surfaces—does not require a primer coat—will not burn or have injurious effect upon a person's skin and has no injurious or toxic fumes.

One of our engineers will gladly call and show you the many advantages of using "RUFLOK" as a protective coating and comparative economy of application.



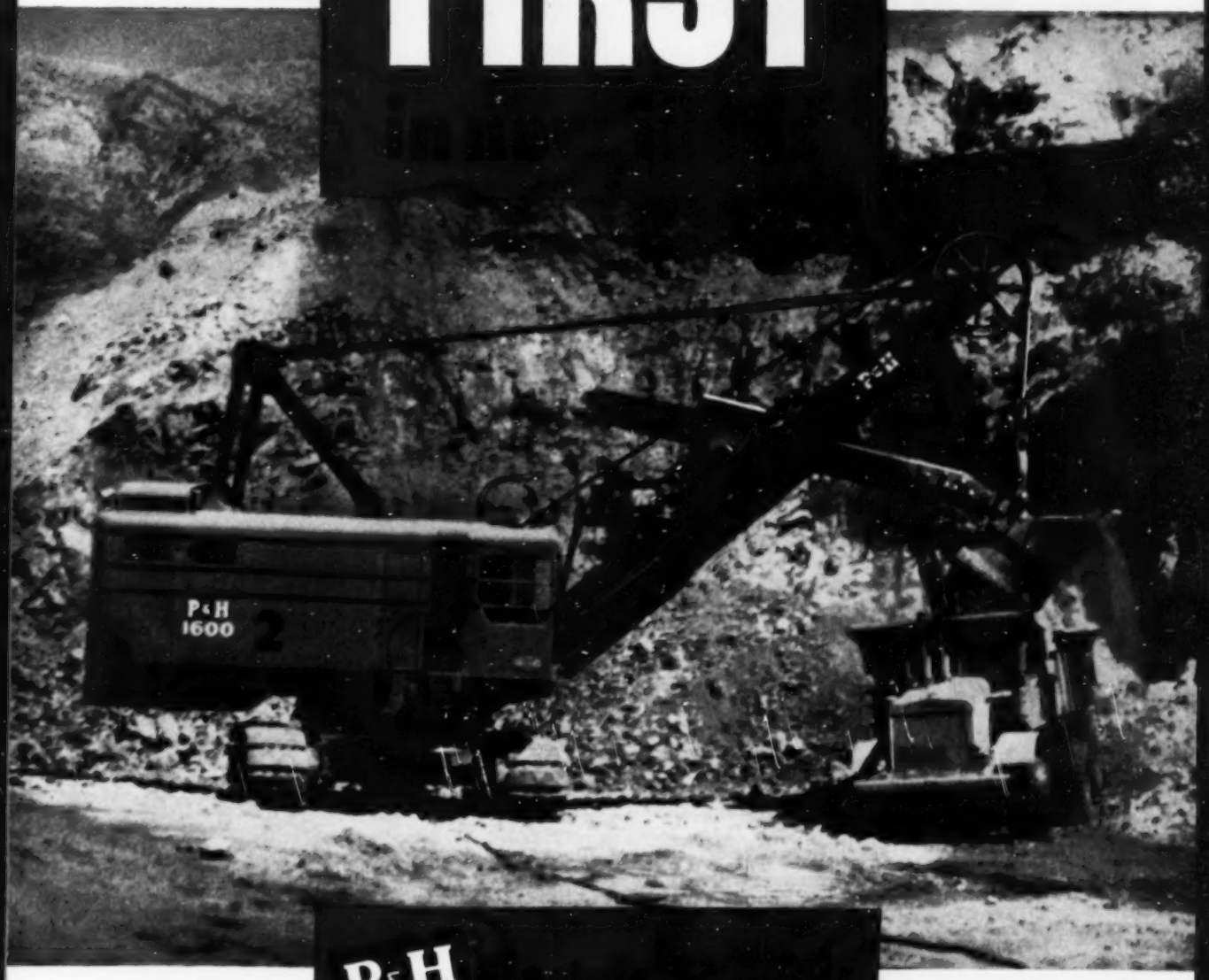
Shows parallel entry not sprayed with "RUFLOK". Note amount of fallen rock.

Shows condition of main entry after 16 months service when sprayed with "RUFLOK".

JOSEPH WOODWELL COMPANY

201 WOOD STREET • • • PITTSBURGH 22, PA.

FIRST



P&H

The first thing you see when you look into P&H Electric Shovels is new ideas—ways of doing things differently. *Differently and better!* For P&H engineering concentrates on one thing . . . cutting *your* production costs!

The result is evident in electrical equipment designed and built by P&H—especially for the purpose—not adapted for it. Stepless power regulation gives you the smoother flow of power without multiple contactors to cause trouble and replacements. There's Magnetorque* Hoist Drive, vertical swing motors, independent propel, powerful worm crowding mechanism with separate crowd motor, air-filtered cab. And there's the all-welded strength of rolled alloy steels to take year-in, year-out punishment.

P&H leadership in electric shovel development gives you leadership in all kinds of open pit work . . . lower tonnage costs! That explains why every third P&H Electric Shovel sold is a repeat order. Get the facts.

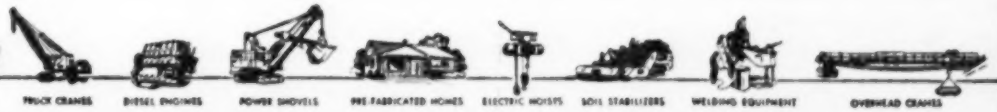
***T. M. of Harnischfeger Corporation for electro-magnetic type coupling.*

P&H LARGE EXCAVATOR DIVISION

HARNISCHFEGER CORPORATION

MILWAUKEE 46, WISCONSIN

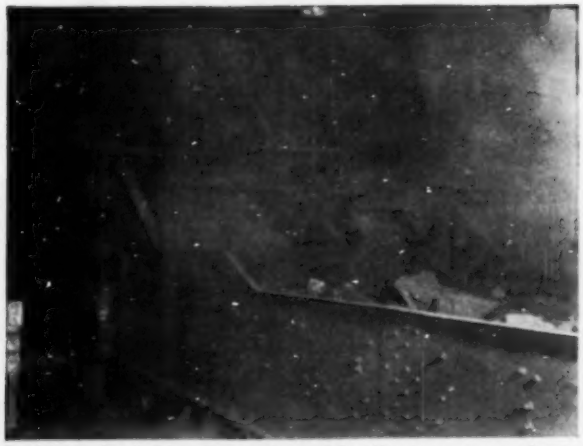
the P&H *Line*



TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PRE-FABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

STOP COAL DUST

Effectively and Economically



Coal being loaded in cars at a large West Virginia mine *without* Johnson-March treatment. Note excessive dust. Compare this unretouched photo with the picture below.

This unretouched photo shows the same operation with a Johnson-March system eliminating dust. These systems have proved themselves in hundreds of mines. We'll be glad to furnish names and addresses.

● A Johnson-March system will provide the answer to *all* your dust problems. It will eliminate the dust explosion hazard, and assure your employees of added safety and better health by preventing dust from rising and mixing with the air. Johnson-March systems can be installed for application at the cutting face, on mining machines, loaders and continuous miners, at dumps or at the tipple. You actually *stop coal dust* right at the source . . . before it becomes an airborne hazard.

Tests by the Bureau of Mines have shown that Johnson-March compounds added to water are 70% to 80% more effective in dust control than water alone.

For more information on low-cost dust control in *your* mine, simply mail the attached coupon for this FREE ILLUSTRATED BROCHURE.

THE JOHNSON-MARCH CORP. CA-8
1724 Chestnut St., Philadelphia 3, Pa.

At no obligation, I'd like to know more about Johnson-March dust control in coal mines. Please send FREE BROCHURE.

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Johnson March

Specialists in Dust Control

1724 CHESTNUT ST. **Philadelphia 3, Pa.**

on the surface . .

in the plant . . . .

underground . . .

REPUBLIC CONVEYOR BELTS MOVE COAL *FASTER... LONGER!*

● Greater tonnage at reduced costs!! That's the story when you use Republic Conveyor Belts.

Republic Belting is the natural choice of both strip and deep mine operators because it keeps moving longer despite the most severe service conditions.

Republic Conveyor Belting is made with tough, resilient rubber covers that resist abrasion and ward off cutting blows from rocks or coal.

Individual plies are evenly impregnated with rubber, then built into a strong, homogeneous structure that will stand up under constant flexing, severe buffeting, impact and other service stresses incidental to mining operations.

Republic Conveyor Belts are supplied to meet your particular specifications in both straight or step-ply construction, with or without breaker strip.

Contact your local Republic Distributor or write direct for further information.

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REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

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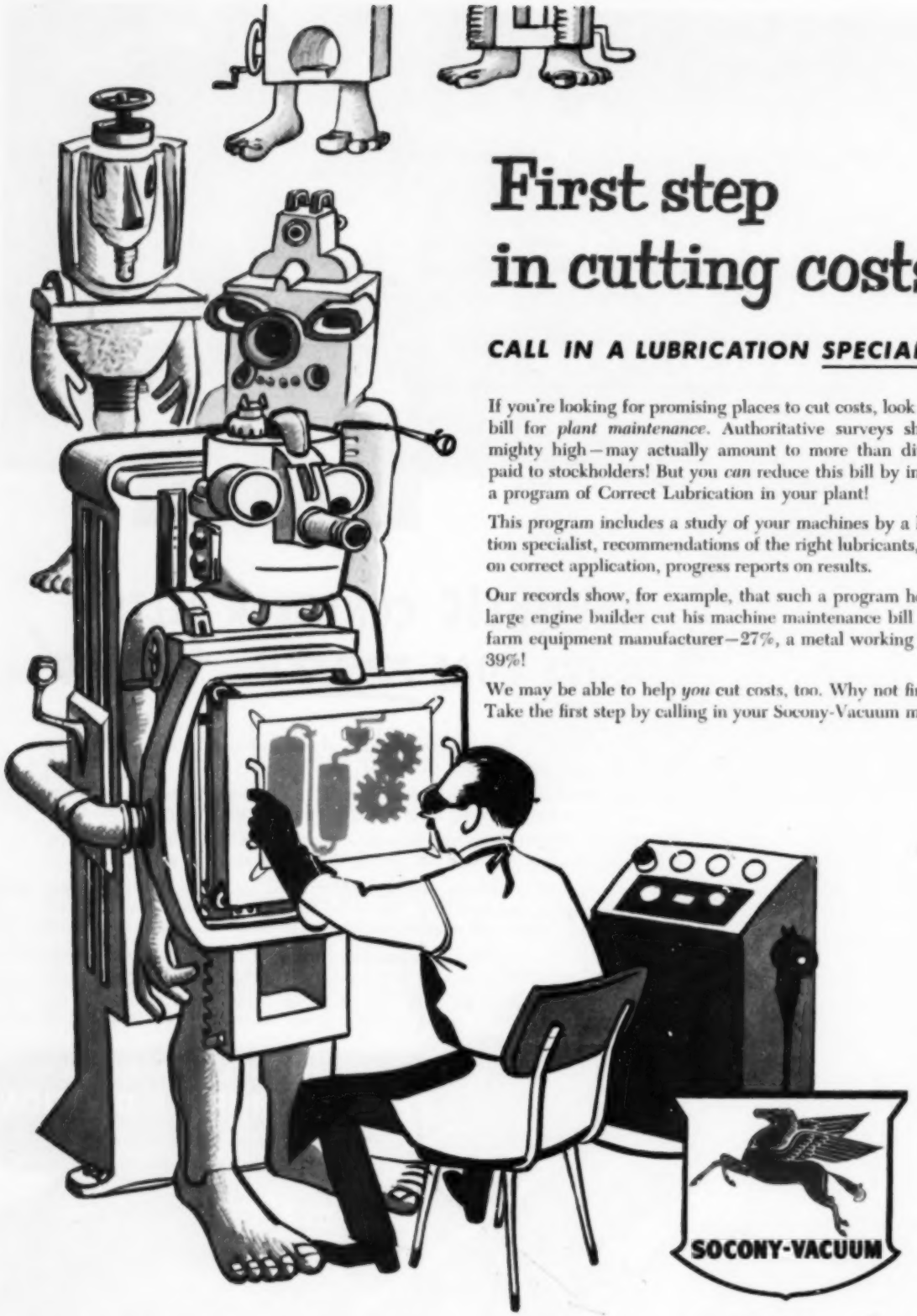
There's a complete REPUBLIC LINE

Republic Rubber . . . the specialist in Industrial Rubber Products . . . makes a complete line of HOSE & BELTING, specially designed for Coal Field service. Call your Republic Distributor for a complete, free analysis of your needs.



First step in cutting costs...

CALL IN A LUBRICATION SPECIALIST!

If you're looking for promising places to cut costs, look at your bill for *plant maintenance*. Authoritative surveys show it's mighty high—may actually amount to more than dividends paid to stockholders! But you *can* reduce this bill by installing a program of Correct Lubrication in your plant!

This program includes a study of your machines by a lubrication specialist, recommendations of the right lubricants, advice on correct application, progress reports on results.

Our records show, for example, that such a program helped a large engine builder cut his machine maintenance bill 24%, a farm equipment manufacturer—27%, a metal working plant—39%!

We may be able to help *you* cut costs, too. Why not find out? Take the first step by calling in your Socony-Vacuum man!

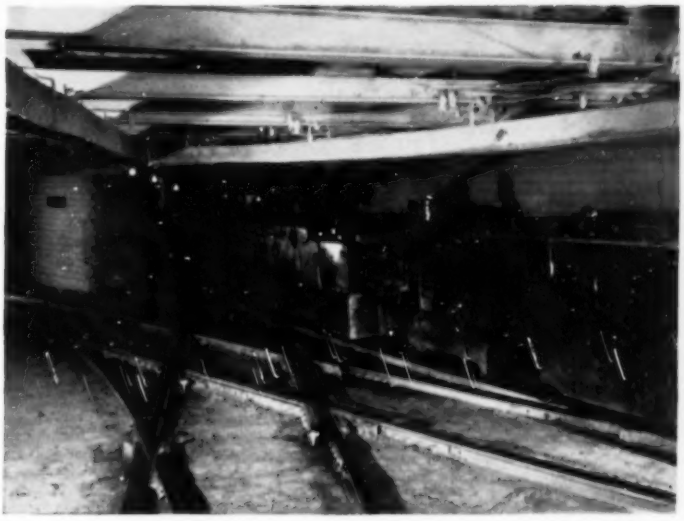
SOCONY-VACUUM

Socony-Vacuum *Correct Lubrication*

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Both Wanted Safe, Fast Haulage

(AND THEY GOT IT!)



Here are scenes at two mines with different problems, but with several things in common. Both are bituminous mines, and both wanted haulage systems that would be safe, fast, and capable of handling big daily tonnages.

In each case, Bethlehem track engineers made exhaustive studies, then designed layouts to meet the specific needs involved. In each case, too, the track was prefabricated at Bethlehem's shops—rails cut and curved, holes drilled, etc.—so that all components could be quickly installed. The mines got the track they were looking for. Safe, smooth, high-speed track complete with turnouts, switch stands, guard rails, braces, joint bars, and all other accessories, even the bolts and nuts. One was a surface job, one below ground—but both made it possible to speed the flow of traffic, avoid costly haulage snarls, and simplify the installation work.

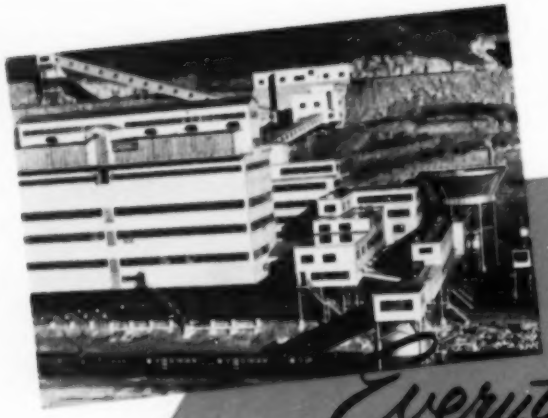
Bethlehem engineers, and Bethlehem prefabricated track, can do the same for you. Call or write us for details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

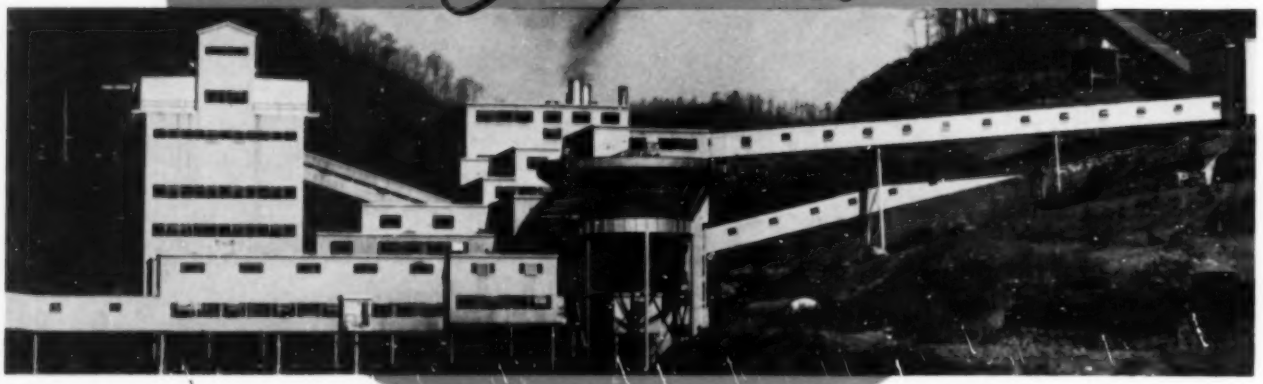
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM PREFABRICATED TRACK

BETHLEHEM STEEL



Everything at ITMANN *is Exceptional*

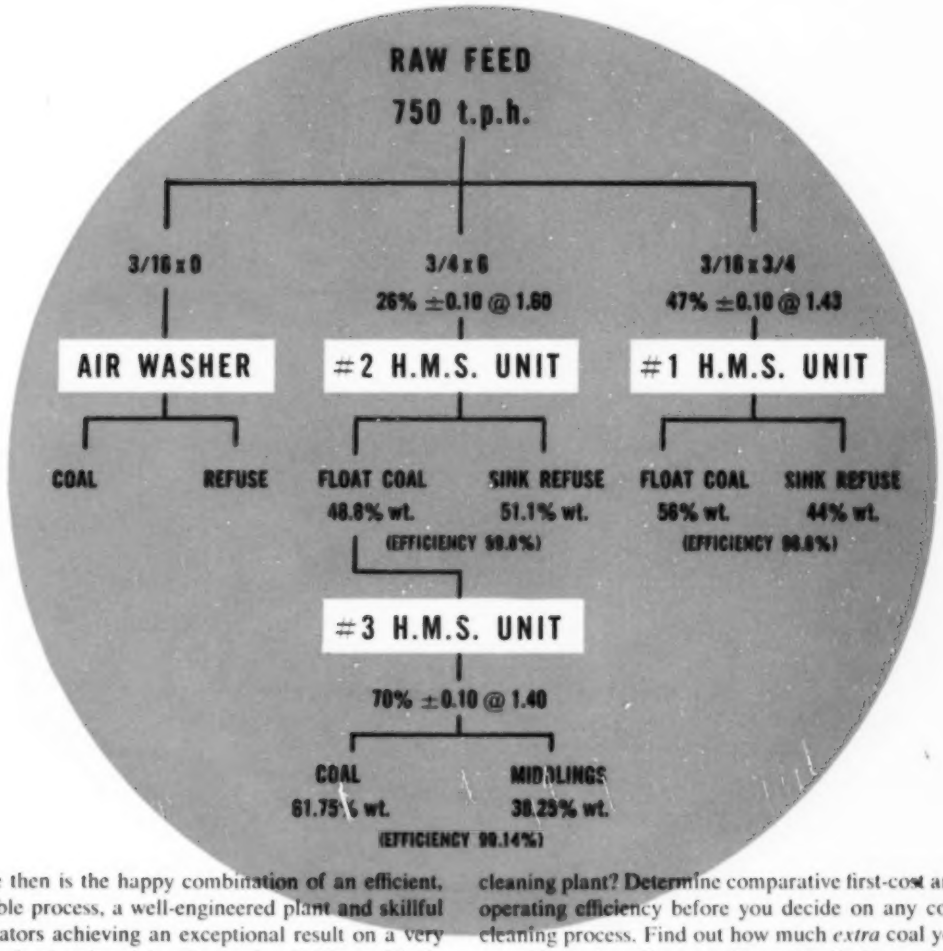


Raw-Feed . . . Tonnage . . . Flow Scheme . . . Percentage of Near-Gravity Material . . . and the Efficiency of the Triple-Unit Heavy-Media Separation Plant

Seldom do you find a bigger, tougher, more unusual cleaning job under one roof! For the Itmann washer makes *not one but three* "super-formidable" separations simultaneously . . . with one separating medium operating at three different gravities over a 3/16 x 6" size range. Located over millions of tons of low-volatile coal on the Pocahontas #3 Seam near Mullins, West Virginia, the Itmann Colliery is a commercial success on a property that could not operate profitably without a flexible, efficient and well operated cleaning plant.

Itmann coal contains a high-percentage of near-gravity material yet each of the three Heavy-Media Separation units closely approximates heavy-liquid separations. As the flow scheme opposite shows – 3/16" material is dropped for air washing. Then 3/16 x 3/4" is screened out for cleaning in #1 Concentrator at 1.43 gravity. Although this fraction of the raw feed contains up to 47% near-gravity materials, 96.6% separating efficiency and a very low-ash shipping coal are attained. The remaining 3/4 x 6" fraction passes to #2 Concentrator for cleaning at 1 60. Here a separating efficiency of 99.8% is achieved on a feed which contains approximately 26% near-gravity material.

Float from the #2 Concentrator feeds the #3 Concentrator which, in turn, produces a very low-ash coal and a saleable middling. Feed to this HMS unit contains as high as 70% near-gravity material but tests show a separating efficiency of 99.14%. (Obviously, separating gravities, percentage of ±0.10 and separating efficiencies vary somewhat as the r.o.m. feed-coal changes. The foregoing are typical, although the plant can and has operated efficiently at lower and higher separating gravities.)



Here then is the happy combination of an efficient, flexible process, a well-engineered plant and skillful operators achieving an exceptional result on a very difficult cleaning job. Obviously, if Heavy-Media Separation can function so well under difficult conditions, there can be no question as to its profitability on easier or tougher separations.

Why lose shipping-grade coal to refuse forevermore by compromising when you build or re-build your cleaning plant? Determine comparative first-cost and operating efficiency before you decide on any coal cleaning process. Find out how much *extra* coal you can ship by installing *true* Heavy-Media Separation.

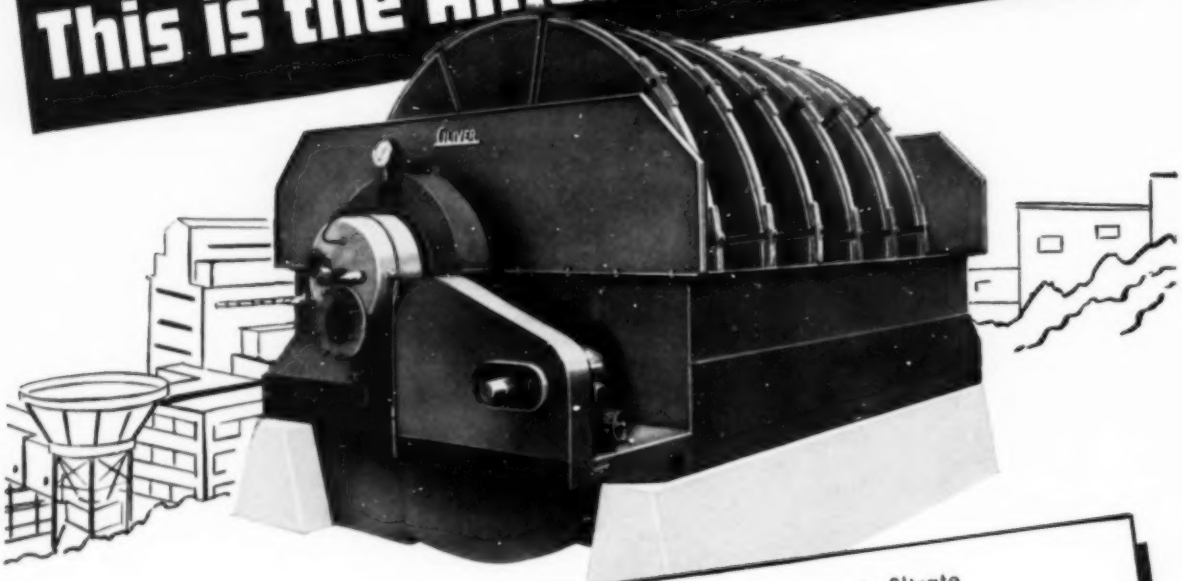
First step toward a well-considered selection of the proper cleaning process for your coal is to talk things over with a nearby Cyanamid Field Engineer. A letter or phone call will bring prompt and unbiased data on which to base your decision.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

This is the AMERICAN FILTER



★ **IT RECOVERS COAL FINES EFFECTIVELY** — less than 1% solids in filtrate

★ **IT AVOIDS PRODUCT DEGRADATION** — handles fines gently

★ **IT REQUIRES LITTLE MAINTENANCE** — no high speed parts

This, in brief, is the record of the Americans now in service. They are uniformly successful, each recovering the fines effectively . . . each doing so without degrading the fines into finer coal . . . each operating at slow speed, thus minimizing maintenance.

Bear in mind, too, that the American is ideal for dewatering slimes and fine refuse used for mine fill or land dumping where it is not practicable or legal to pump to sludge ponds or where stream pollution is a factor. The American produces a cake that is easily handled.

If 'fines' are a problem in your washery, here is the filter that will solve it and here, at Oliver United, you can get what is equally important . . . the most experienced advice and recommendations on fines recovery.

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Pendulum arch supports
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4 Powerful Reasons Why CHEVROLET ADVANCE-DESIGN TRUCKS will save money on *your* job . . .

EXTRA THRIFTY POWER! The improved Loadmaster engine in heavy-duty models has new high-compression ratio (7.1 to 1) to squeeze more power . . . more work out of every drop of fuel. In light- and medium-duty models, Chevrolet's advanced Thriftmaster engine delivers top-notch operating economy. Both give you the extra-long life and day-in, day-out dependability for which Chevrolet valve-in-head truck engines are famous.

ENGINEERED FOR THE JOB! Whatever you haul . . . wherever you haul it, your Chevrolet truck will be factory-matched to fit your requirements. That means you get the *right* power and the *right* chassis units throughout—tires, axles, springs and clutch—to suit your roads and loads. It means a truck that will do your job more easily . . . more efficiently.

MORE RUGGEDLY BUILT! New Chevrolet trucks are stronger and sturdier than ever before. Frames, for example, are heavier and more rigid. This extra, built-in stamina means miles added to truck life and dollars *subtracted* from upkeep costs! Another important "plus" you get with Chevrolet trucks!

AND THEY LIST FOR LESS! No other truck offers all of Chevrolet's advance-design features . . . all of Chevrolet's money-saving advantages. Yet Chevrolet is the lowest priced truck line of all! See your Chevrolet Dealer. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

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TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTIPANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

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. . . everything you need for faster production, greater tonnage per shift at less cost.

With a Goodman loader on the job, the head can be lifted to attack tight coal well above mine bottom. Swing-motion is a feature that permits wide cleanup with minimum maneuvering. Pillar extraction work in close timbering is made easy by swing of both loading head and discharge end to either side.

Let us arrange a mine visit so you can see GOODMAN swing-motion loaders at work — there is a difference.

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4 TYPES, 4 SIZES: ALL SWING-MOTION

TYPE	TRAMMING HEIGHT
665	41½ inches
666	36½ inches
660	33 inches
865	26½ inches

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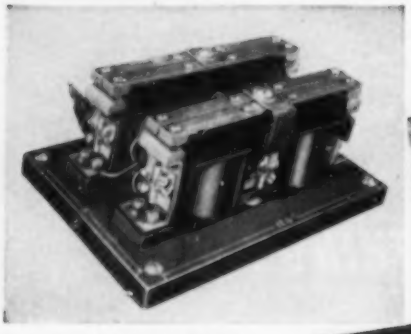

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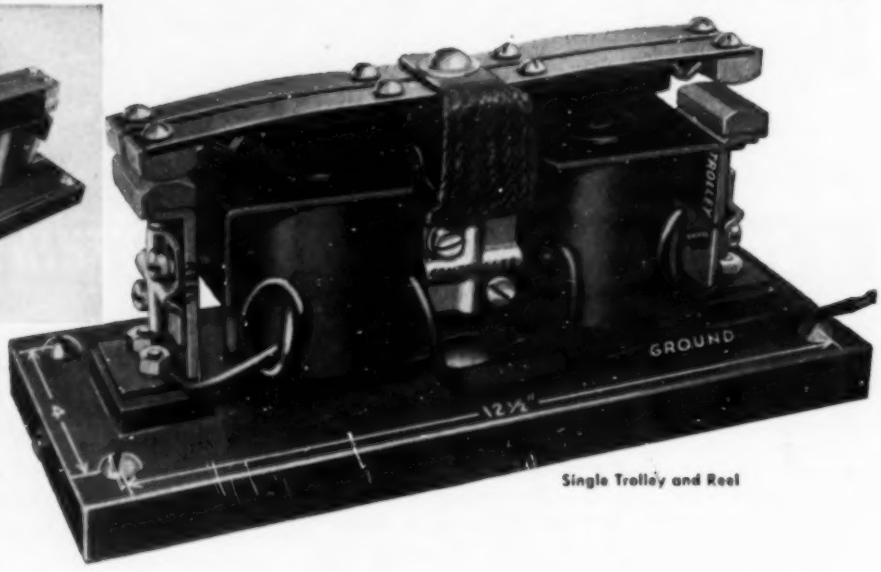
Available in 230 to 600 Volts



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P-G Automatic Transfer Switches are designed for use on all types and makes of gathering locomotives.

Automatically transfers the current from trolley to reel, or vice-versa. Hand operated switches are eliminated.

Promotes safety—avoid shocks or burns to operator while changing from trolley to reel.

Simple in design, easy to install, requires very little space, and can be mounted anywhere. Furnished complete with cover.

Heavy duty coils provide for positive contact through double contact assembly. Contacts are easily renewable.

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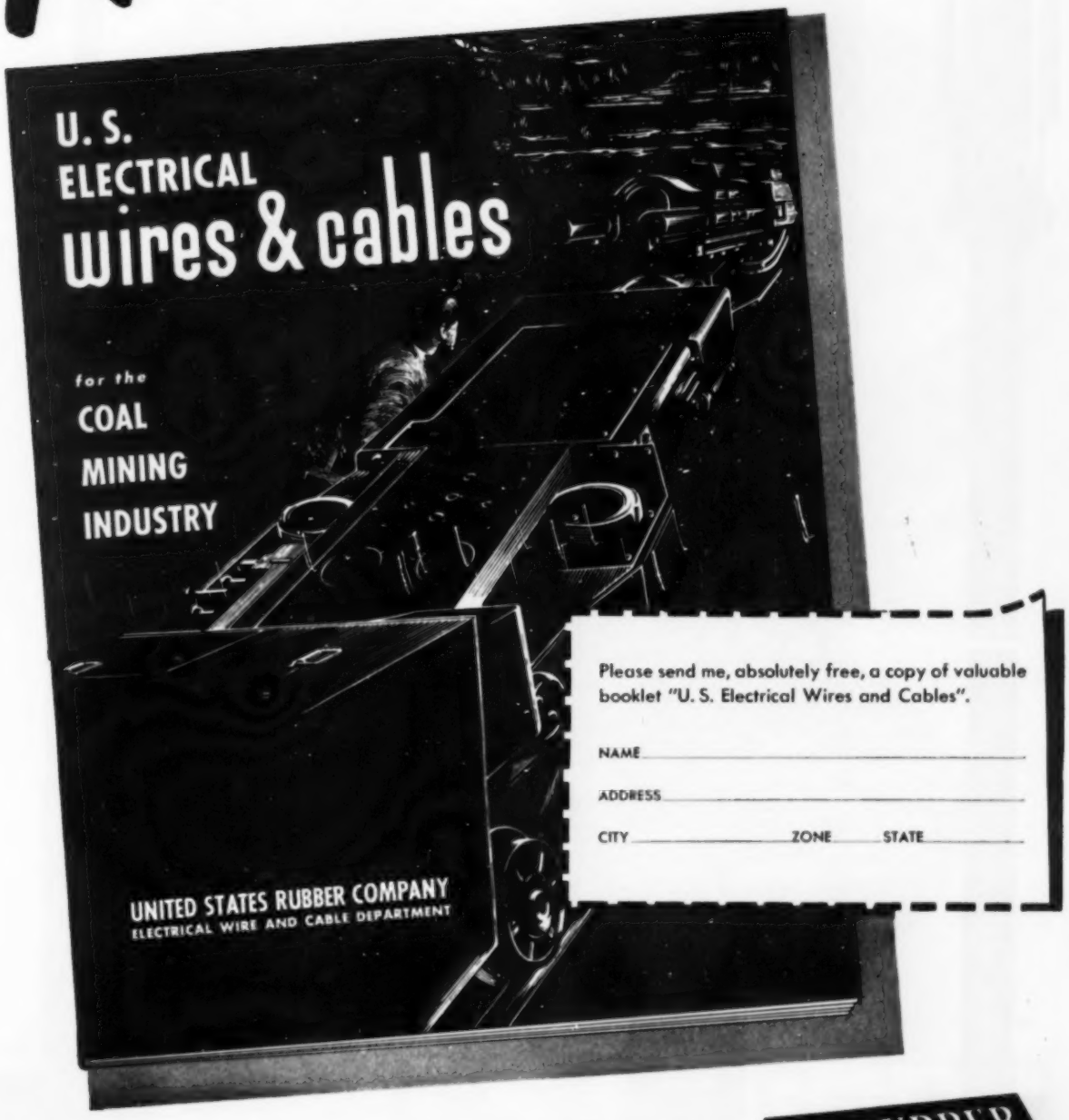

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In addition to providing a roof that's secure, roof bolting also offers mine operators these important advantages:

1. Increased production.
2. Elimination of timber supports.
3. Improved ventilation.
4. Wider mine openings, and greater side clearances.
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You can obtain these ideal conditions by using either of two types of roof bolts made by Bethlehem — the slotted type or the square-head type. Full information about either bolt may be obtained by writing to us at Bethlehem, Pa.

SQUARE-HEAD ROOF BOLT. With expansion shell. A rolled-thread bolt with unchamfered head. Fits 1⅜-in. hole. Pressed ears on shank support shell during anchoring. When bolt is tightened, leaves of shell expand to provide holding pressure. By locking against sides of hole, leaves prevent shell from turning during installation.

SLOTTED ROOF BOLT. Has forged slot to accommodate steel wedge. Slot is automatically centered, forming equivalent of two half-rounds. Opposite end of bolt has 5 in. of 1-in. rolled threads. When driven in 1¼-in. hole, wedge penetrates slot, spreading bolt-end. Truncated-cone point prevents thread damage. Fitted with American Standard Regular Square Nut.

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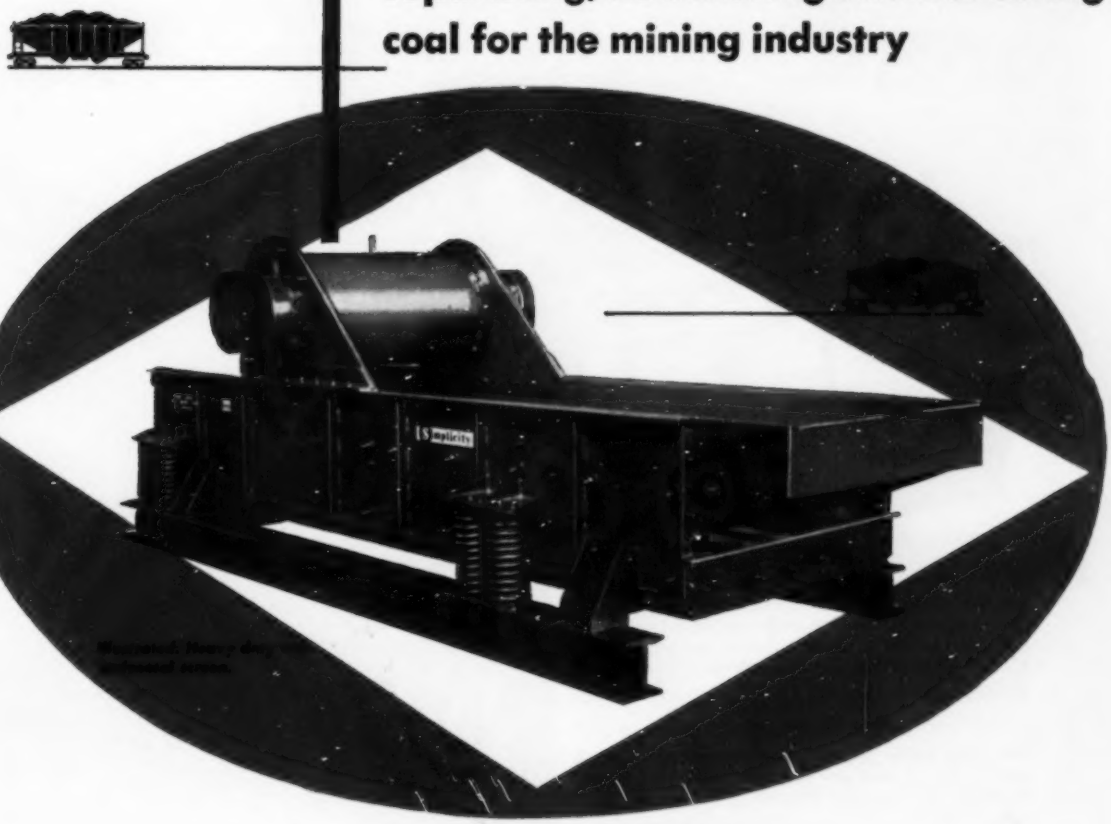
BETHLEHEM MINE ROOF BOLTS

SIMPLICITY SCREENS

do a fast, efficient job of sizing, separating, dewatering and dedusting coal for the mining industry



SIMPLICITY gyrating, horizontal, simpliflo screens all have their place in the tough job of processing coal. They handle the coarse scalping, size, separate and grade coal, dewater fine coal sludge, and dedust coal in dry screening operations. Special ball tray deck models even screen damp, sticky coal through small mesh screen cloth without blinding. The unique screening actions and the heavy, powerful construction of SIMPLICITY Screens help maintain high daily production rates throughout the coal industry. All model Screens available in a wide range of sizes. For complete information, consult a SIMPLICITY sales engineer or write us today.

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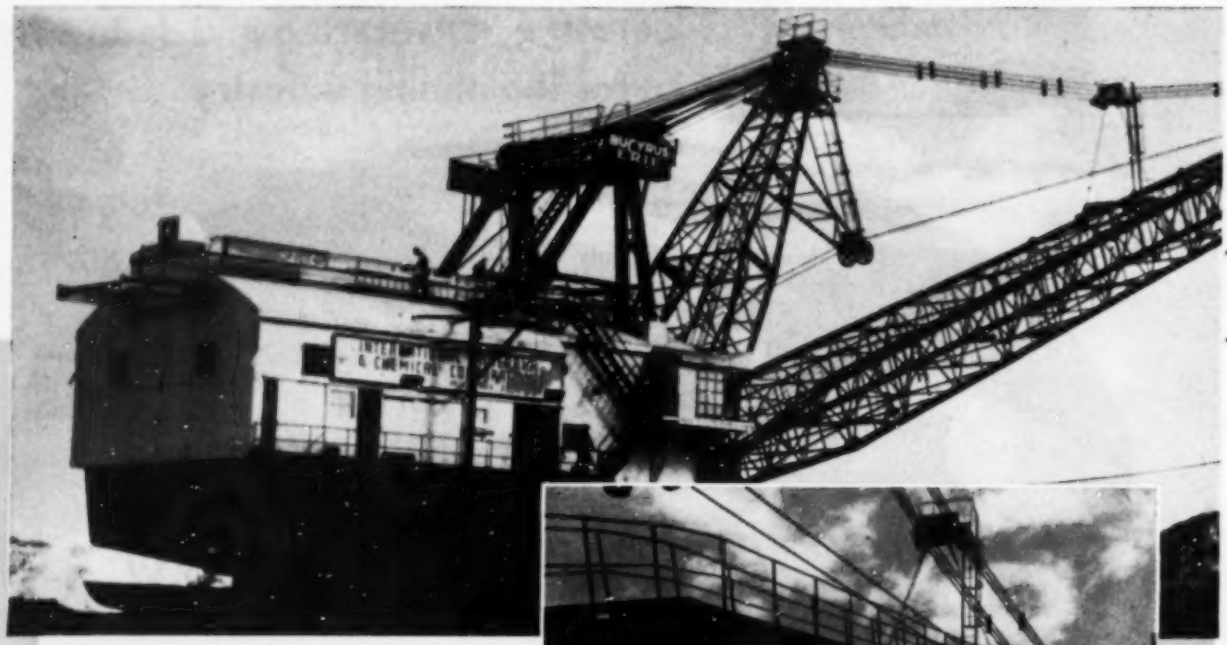
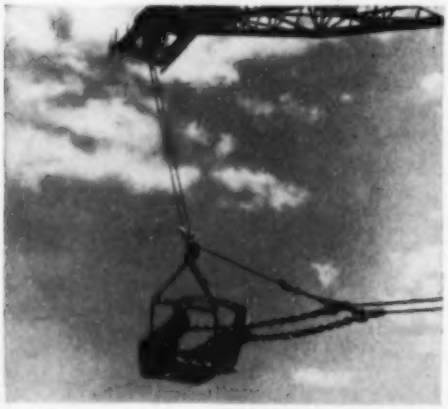
The Bigger Digger moves



THE BIGGER DIGGER makes a round trip once a minute . . . moves 21.5 cu. yds. each trip. Huge loads like that put a terrific stress on boom suspension cables, but Tiger Brand Boom Support Strand has the needed strength.

THE DRAG LINES on the Bigger Digger must withstand a lot of wear and heavy pulls. Special Tiger Brand Drag Lines meet these requirements and give long service.



THE HOISTING ROPES are Tiger Brand too. They have the fatigue resistance needed for constant flexing over sheaves and drums.

Send for helpful guide book ▶

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Cleveland 13, Ohio

Please send me, without obligation, a copy of your "Wire Rope Recommendation Book."

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1,000,000 cu. yds. a month

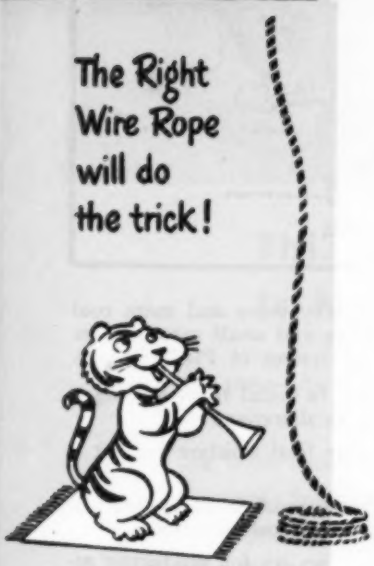
-with Tiger Brand Wire Ropes

● This huge dragline scoops out overburden and phosphate matrix at the rate of 21.5 cu. yds. per minute. It's the Bigger Digger at International Minerals & Chemical Co.'s phosphate mine near Mulberry, Florida. Drag lines, hoist ropes, and boom suspension cables on the Bigger Digger take a lot of hard wear—and they have to be strong. Amercian Tiger Brand Wire Ropes provide the right combination of strength, wear resistance, and flexibility for these tough jobs.

The duty on the boom suspension cables is especially exacting. The Bigger Digger has the longest boom on record—215 ft. long—and the suspension cables, besides great tensile strength, must possess strictly uniform physical properties. Tiger Brand Boom Support Strand just fits these tough requirements.

You can choose from these and hundreds of other types and sizes of Tiger Brand Ropes—there's one that has been specially designed to suit every wire rope job you have. Our "Wire Rope Recommendation Book" is an excellent guide to the proper selection of ropes. It's packed with helpful application information and lists the best ropes to use for typical rope jobs. Just send the coupon for a free copy.

The Right Wire Rope will do the trick!



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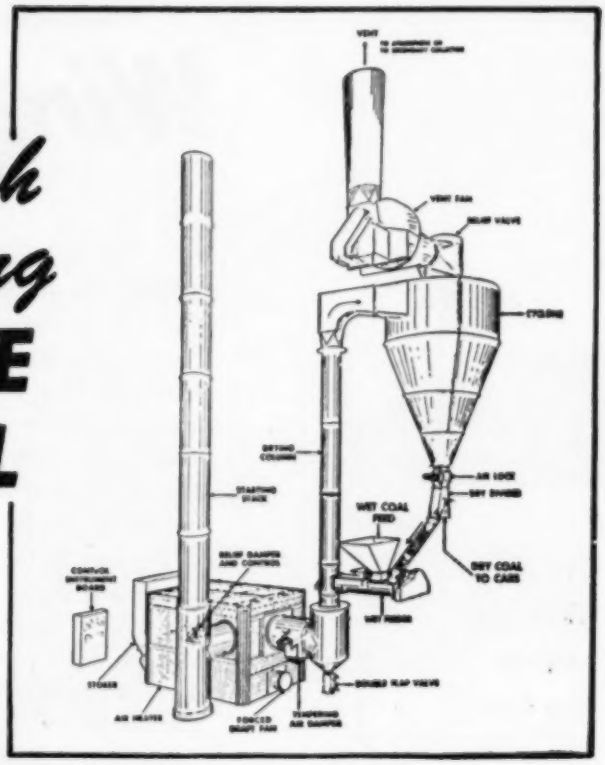

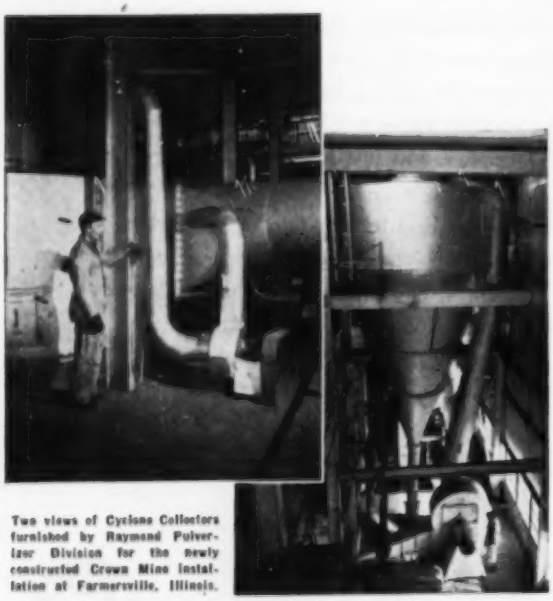

Two views of Cyclone Collectors furnished by Raymond Pulverizer Division for the newly constructed Crown Mine installation at Farmersville, Illinois.

There are practical reasons why more and more coal cleaning plants, of both large and small capacity, are adopting the C-E Raymond System of Flash Drying.

Units of equipment are easy to install to fit existing plant layout without extensive alterations.

Close control is assured over final moisture content of finished product.

Automatic handling of the material in an enclosed, dustless system insures safe, low-cost operation.

The C-E Raymond System is set up for producing required grades of coal from ⅜" down to the lowest mesh coal made. A single drying column has a range of 10 to 75 tons per hour. Multiple columns may be connected to a single furnace for still higher capacities.

Write for Bulletin FD-51

COMBUSTION ENGINEERING, INC.

Flash dryer division

1315 North Branch St. **Chicago 22, Illinois**

MARION 151-M

SEVEN CUBIC YARDS

This Big, Fast, Hard-Hitting Shovel Is Making History in Metal Mining

The seven-cubic-yard dipper of the MARION 151-M is only one indication of the work it can do.

The small-machine cycle time made possible by the world's finest electrical controls makes the 7-yard dipper of the MARION 151-M more productive than you might expect.

The month-after-month dependability of the 151-M, except for routine maintenance, is another big factor in year-long production output.

Don't say "seven isn't enough" until you see what others are doing with the biggest seven-yard performer that ever hit the mine pits.

Some of the biggest companies in mining are 151-M owners. More than half of these owners have two or more 151-M machines. Your nearest MARION District office can show you why.

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from 3/4 cu. yd. to 45 cu. yds.

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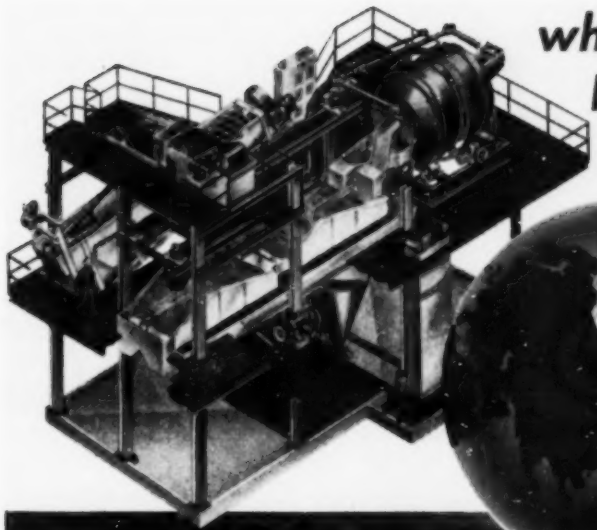

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CUSTOM BUILT PLANTS

Wemco's extensive engineering and equipment experience is your assurance of our ability to design and install complete custom built preparation plants.

RENT OR PURCHASE WEMCO MOBIL-MILLS

Take advantage of Wemco's rental, rental/option to purchase, or outright purchase plans.

Write today for Bulletin M-3-M-4 and for further information on the use of Mobil-Mills in coal cleaning operations.

Approximately 185 Heavy Media plants have been placed in operation or are under construction throughout the world. Of these, 100 are Wemco Mobil-Mills located in 18 states and 15 foreign countries, and having an aggregate rated capacity of **50 million** tons annually. Here is remarkable proof of Wemco's design know-how and extensive experience in the Heavy Media Separation field.

Anthracite and bituminous coal rank first in tonnage among materials now being economically produced by Mobil-Mills. Wemco Mobil-Mills provide accurate control over coal washing with the necessary flexibility for efficient cleaning of a wide range of sizes and grades. More and more coal operators are using Mobil-Mill cleaning to assure a high yield of clean coal—the kind that always finds a steady demand. You, too, will find it profitable to learn more about the Wemco Mobil-Mill.

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- **Clean, sharp separation with high yield.**

Mobil-Mills are furnished in five basic sizes and several models with smaller or larger plants varying in capacity from 25 to 420 TPH. Each plant is equipped with a choice of one of the following type separators:

1. **WEMCO SINGLE DRUM for accurately controlled washing of a full range of sizes from 8" to ¼".**
2. **WEMCO TWO COMPARTMENT DRUM for efficient cleaning of coal having middling content requiring two-gravity, three product separation.**
3. **WEMCO CONE SEPARATOR for economical, large volume production of fine coal up to 4" in size.**

"Here's one place where it pays to be TIGHT!

"Shooting a blast is like jumping with a parachute . . . everything's got to work right the first time, or else!

"And everything depends on the loading and hook-up. You need *tight* connections all along the line, and you get 'em quickly and easily with Primacord.

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"Just remember to *pull it up tight*. You can, with Primacord."

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P-2

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

AUGUST, 1953 IVAN A. GIVEN, EDITOR

Potent Ally

ENGINEERING, of course, isn't everything in the operation of a mill or mine. Without good management—at all levels—no property can reach the efficiency, quality and safety necessary for commercial and financial success. Good operating management, in fact, goes in for a lot of informal engineering. But the records of companies that utilize broad-scale engineering facilities, including "industrial engineering," meaning "the technique of organizing and conducting an industry or an enterprise," are evidence that formal, organized engineering, in conjunction with good management, really pays off.

Manifestly, not every company can afford a large engineering staff. In fact, there are not enough engineers around today to permit every company to add even one to its staff, again pointing up the need for encouraging young men to take up engineering as a career. At the same time, engineering is a most worthwhile investment. Therefore, how can it be obtained—or enough so that operating management can function more nearly as it should, not necessarily in big jobs, but in the day-to-day conduct of mining operations where a large part of the financial record is made. Even one or two days of engineering service a month could help in many instances. For this, companies can turn to established consultants—mining, electrical and otherwise. Another suggestion is for several companies to go together to employ the necessary engineering talent. But whatever the arrangement, engineering is proving itself more and more on the balance sheet.

More Evidence

THE FACT that the production curves for both anthracite and bituminous have been trending up for several weeks—at least at the time of this writing—provides another opportunity for noting that neither product is anywhere near being counted out. Those who hold that coal, in spite of the problems that confront it today, still has the inside track now include the majority of the retailers attending the 1953 convention of the American Retail Coal Association, Detroit, June 16-17, who expressed themselves as optimistic for the future of their particular businesses. Many, in fact, expect to expand by taking over competitors or opening new yards. They feel, in short, that they have a good opportunity to live and prosper.

Among other plusses for coal are such contrasting ones as recent increases in the prices of petroleum products, though heavy fuel oil was hiked less than the others, and the decision of some coal companies to suspend operations rather than sell at less than a fair profit. The question of residual imports still is to be settled, but coal at the same time is giving greater thought to improving its sales and service setups to capitalize more fully on the money spent at the mines to cut cost and raise quality. The industry, in short, is coming more to grips with its problems and is receiving help, encouragement and—with hikes in oil and gas prices—involuntary aid in its program. Confidence and respect for coal are growing among consumers and distributors, and competition is finding the sledding rougher. The evidence grows that continuing to bear down will pay off for coal—and relatively soon.

Short Takes

THE RECENT PRICE RISES in domestic crude oil and petroleum products, it is pointed out, could complicate everybody's life unless foreign producers of crude and products come up too. The resultant stress and strain could generate some unexpected additional support for a realistic import policy.

The hassels that seem to be becoming customary in picking the head of the Bureau of Mines are, at best, unfortunate. It would be nice to have a coal man, but the overriding goal is a well-qualified appointee, regardless of his origin.

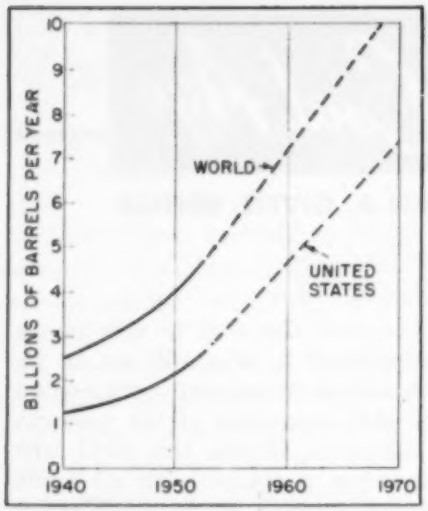


FIG. 1—LIQUID-FUEL DEMAND everywhere will climb. But bigger demand abroad will whittle down imports to United States.

U.S. Oil Outlook: How Coal Fits In

When demand for oil outstrips production, what then?

A top thinker on petroleum sees residual upgraded to distillates, imports dwindling and liquid fuel from coal. And not too far off.

By EUGENE AYRES
Technical Assistant to the Executive Vice President, Gulf Research & Development Co., Pittsburgh, Pa.

HOW MUCH OIL CAN WE COUNT ON? And for how long?

When, if ever, will we have to supplement petroleum-produced liquid fuel with synthetics?

What's the outlook for imports?

Condensed from an address before the Second American Power Conference, Chicago, March, 1953.

Men who know the facts are confident that liquid fuels will have a long and abundant life. They count on improved technology in discovery of petroleum, in percentage of recovery and in manufacture of supplemental liquid fuels to stretch known reserves and add new sources of supply.

But these same men know also that reserves of natural petroleum in the United States and elsewhere are finite, that the time will come when oil must start to decline.

Even so, they are not worried right now. Their view, by and large, is reflected in a report titled "Petroleum Productive Capacity," issued in January, 1951, by the National Petroleum Council's Committee on Oil and Gas Availability. That report concludes: "Our prospects are good for the discovery of petroleum and for ample supplies of fuels generally for the foreseeable future."

During the past 90 yr, the world has depended almost exclusively upon natural petroleum for liquid fuel. Less than 0.1% has come from oil shale and coal. The reason for this has been

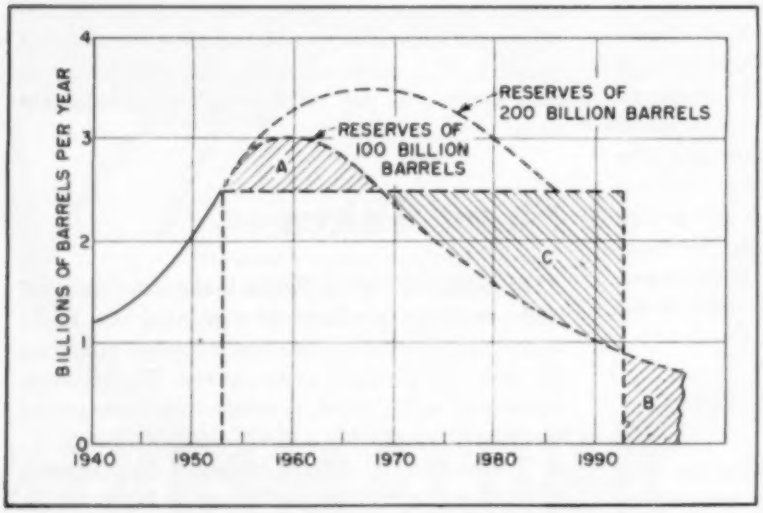


FIG. 2—U. S. PRODUCTION, whether you assume 100- or 200-billion barrels of reserves, will reach its peak some not-too-far-distant day. After the peak comes the decline.

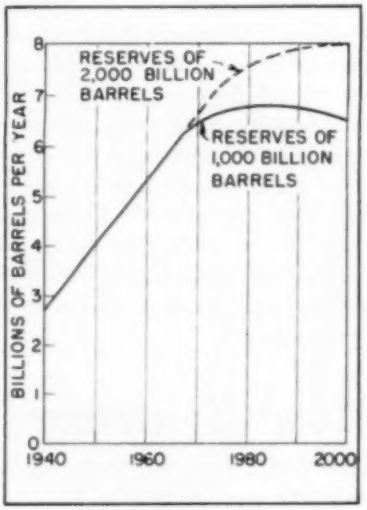


FIG. 3—WORLD PRODUCTION, with reserve estimates based on shaky geology, may not provide enough for all.

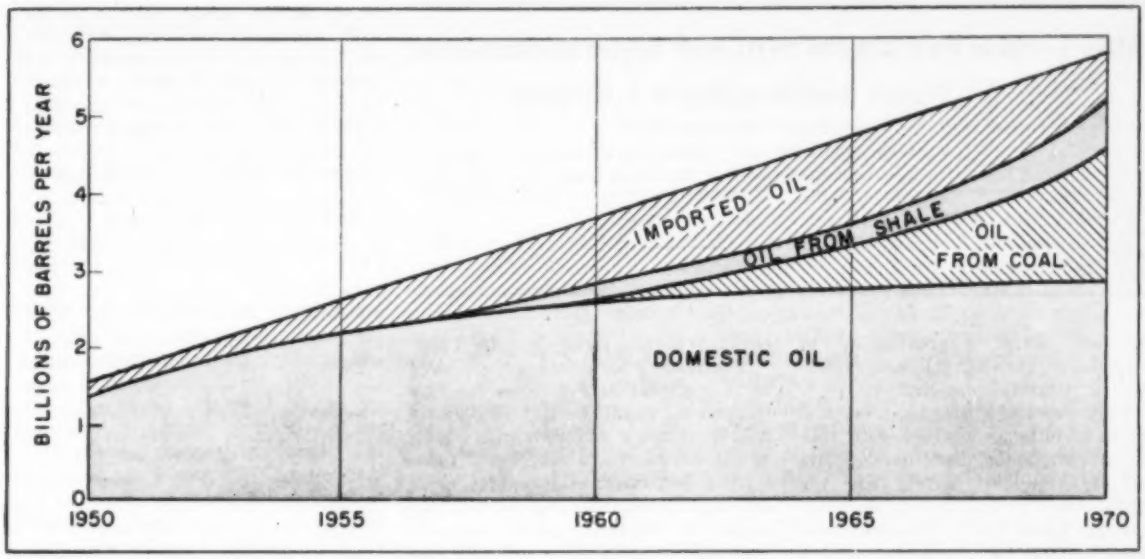


FIG. 4—DISTILLATE FUELS of the future will come from various sources, with imports to the United States passing their peak about 1965 and with synthetic liquid fuels growing steadily after 1960.

economic. As long as we have an adequate supply of cheap petroleum, we shall not seek more expensive substitutes.

How long will cheap petroleum be in adequate supply?

The answer hinges on four numbers, as follows:

1. Supply in the United States.
2. Demand in the United States.
3. Supply in the rest of the world.
4. Demand in the rest of the world.

Now, adequacy is measured by the difference between supply and demand. And that is where oil men fail to see eye to eye, all of them. Some of them tend to subtract relatively small numbers from relatively large ones. Looking ahead, they see bountiful supplies, well ahead of moderate demand. But their fellows do the opposite. They see lean supplies ahead, falling behind ever-growing demand.

Historically, the course of events has shown that those who have been bearish on supply or demand have been absurdly wrong. For example, petroleum economists expected a 20% drop in motor-fuel consumption for the first few years after World War II. Instead, we had a 20% rise. Even more recently, in 1950, an address before the American Petroleum Institute contained the prediction that United States demand by 1960 might be "over 8,000,000 bbl a day." That prediction already has been discounted, for the Petroleum Administration for Defense in January, 1953, expected oil demand to be a little above 8,000,000 bbl a day this year—7 yr ahead of schedule. Early in 1952, I was criticized for assuming a demand as high as 8,800,000 bbl per day in 1960. Now it seems this figure will be exceeded in 1954.

The most interesting thing about these predictions is that the largest errors on the low side have been made by the best informed authorities and that no one, not even the most poorly informed, has made an error on the high side.

The truth is that leveling-off of demand in the United States, with saturation of markets for liquid fuels, has seemed imminent for the past 40 yr. But demand always has exceeded expectations. No one can possibly say how much longer it will continue to do so. But I believe that events will continue to confound any bearish outlook until technology shall have substituted something better than liquid fuel for major uses.

WORLD DEMAND WILL BOOM

How about demand in the rest of the world?

The rest of the world is increasing its consumption of petroleum more rapidly than we are. The most obvious explanation is that the rest of the world has a far greater margin for technological improvement and for potential demand than we have. In 1910, we consumed 21 times as much oil per capita as the rest of the world. That factor rose until the maximum distortion was reached in 1930, when we consumed 30 times as much per capita as the rest of the world. Since 1930, the factor has become smaller each year. In 1940, it was 26; in 1945, 22; now, 16. So no matter how steep we draw the curve of United States consumption, we must make the curve of world consumption even steeper.

These qualitative observations are illustrated in Fig. 1, in which demand is extrapolated to 1970. In spite of the lessons of the past, I have not the courage to do more than draw straight lines from present trends. I have taken the liberty of smoothing out the curves prior to 1953.

These demand trends, for what they may be worth, give two of the numbers required for determination of adequacy of oil—demand in the United States and demand in the rest of the world. A distinction, by the way, should be made between demand and consumption. Demand will be the quantity desired at a price. Consumption will be the quantity actually used, which may be lower than demand to the extent that petroleum may be either unavailable or too costly.

The other two numbers required for determination of adequacy must come from expectations of supply in the United States and elsewhere. Supply, of course, is not the volume of reserves, but the rate at which petroleum can be produced. Rate of production has been related to rate of discovery and number of wells drilled. I prefer to relate it to a single factor—quantity of ultimate reserves. This way, we have something definite to tie to, almost independent of rate of discovery, magnitude of

Table I—How Petroleum Will Fall Short of Demand

Imports Needed to Meet U. S. Demands

(Billions of barrels per year)

Year	Assuming 100-Billion Barrels of Reserves	Assuming 200-Billion Barrels of Reserves	World Shortage
1950	0.2	0.2	0
1960	1.5	1.2	1.8
1970	5.0	4.0	3.8
1980	8.4	7.0	7.2

discovery effort, improvements in technology, general business index, wars or political upheavals.

A few years ago, generally accepted figures of ultimate reserves were 100-billion barrels for the United States and 1,000-billion barrels for the world. After it was shown, in 1952, that this figure for the United States meant a peak of production only a few years away, the data were re-examined and various methods of extrapolation were studied in an attempt to arrive at ultimate reserve figures based on statistical trends. If it is assumed that the peak of United States production must come later than 1960, it is necessary to assume that our ultimate reserve is much larger than 100-billion barrels. One estimate, made in late 1952, is 120-billion barrels. But even this cannot postpone our peak of production more than a few years. So some petroleum people now are talking about 200-billion barrels.

Such estimates include recoverable oil from off-shore pools. Newspapers have mentioned 100-billion barrels for these fields alone. But maximum actual recovery may not be more than one-fifth of this and could be very much lower. For example, the Sprayberry field, covering more than five times as much area as the great East Texas field, now is showing only about 10% recovery of oil. The other 90% is left behind—permanently.

The higher estimates of ultimate reserve, like those above, are based not on firm physical data but on a passionate desire to postpone the time when production will be inadequate. The higher estimates may prove right. Within a decade, we should know.

In Fig. 2, oil production in the United States is extrapolated to 1993, based on ultimate recoverable reserves of 100- and 200-billion barrels. The graph shows that doubling the reserve postpones the peak of production from 1960 to 1970. If the lower number is right, the evidence should appear in 3 to 4 yr, with somewhat less increase in production rate. If the higher figure is right, the evidence should come clear by 1960.

The reasons for drawing the curves as they appear in Fig. 2 are familiar to most oil men. For 100-billion barrels, a rectangle is shown with a side of 2.5-billion barrels—expected production in 1953—and extending 40 yr into the future. The area of this rectangle is 100. If the area under the production curve is to be 100, the sum of areas A and B must be made equal to C. The shape is rather indefinite inasmuch as the curve may be expected to approach zero almost tangentially after 1990.

PEAK OIL FLOW—HOW HIGH?

Fig. 2 being an example of the substitution of art for mathematics, we cannot know how high the peak may be or how sharply the curve may drop. But if the curve is made to look reasonable, it is quite possible to adapt mathematical expressions to it and to determine, in this way, the peak dates corresponding to various ultimate recoverable reserve numbers.

These extrapolations are made without reference to rate of development or discovery of reserves. Since a definite relationship exists between rate of production and magnitude of proved reserves, the shape of production curves must assume that reserves will be found at an adequate rate. It is interesting to consider what would happen if the proving up of reserves were to take place abnormally fast or abnormally slowly.

First, take the imaginary and impossible extreme in which, by the waving of a geophysical wand, all remaining oil reserves of the earth were discovered tomorrow. In such event, the only limitation to rate of production, aside from cost, would be rate of demand. Production might rise higher than shown in Fig. 2, but would have to fall more abruptly.

The opposite extreme, equally absurd, is that no more reserves are ever proved. In this event, the peak of production would be with us now and the area inscribed by the curve would be far below 100-billion bbl.

It is probable, of course, that reserves in the future will be found with increasing difficulty and that the last quarter of reserves may not be found for several centuries, resulting in a very long tail on the production curve. But whether reserves are found faster or slower than rate of demand affects only the height of the peak and the sharpness of it.

The production curve for the world is shown in Fig. 3. An ultimate reserve of 1,000-billion barrels has less foundation of geological data than estimates for the United States. Most petroleum people feel that political and economic hurdles in foreign countries may retard discovery to such an extent that the peak may not reach as high as 7-billion barrels and may therefore descend less abruptly than shown. But even if the ultimate reserve of the world turns out to be double that now assumed, the peak should come by this century's end.

We now have the four numbers required to determine adequacy—supply in the United States and elsewhere, and demand here and elsewhere. Subtraction of supply from demand gives imports for the United States and shortage for the world.

Estimated petoleum deficiencies shown in Table I are obtained from the curves in Figs. 1, 2 and 3. The resulting picture is rather surprising in two respects: (1) it makes little difference whether we assume 100- or 200-billion barrels for ultimate United States reserve; and (2) world shortage seems to be roughly parallel to United States import needs.

POLICY DECISIONS AHEAD

The actual numbers in Table I can have little quantitative significance but the lessons to be drawn from their trend and magnitude are inescapable. The primary lesson is this: In spite of the vastness of United States and world petroleum reserves and the possibility of continued production for a century or more, we shall be faced within a few years—not a few decades—with fundamental decisions on liquid fuel supplies.

At present, potential productive capacity in our own country is somewhat higher than production, but at slightly higher cost. This is shown by our increasing imports. If we could not import, we still could take care of our needs by domestic production. But it is better, on conservational and economic grounds, to import some of our requirements. This situation, however, cannot continue much longer, because imports soon should cost more because of competitive bidding from the rest of the world.

By 1960, it seems that domestic production even up to the limit of productive capacity will not meet domestic needs. When imports become essential, they will be expensive, and as the need grows, availability of imports will drop. Because of world shortage, either the United States or other countries will have to do without full measure of petroleum.

OUTLOOK DISMAL?—NOT AT ALL

At first glance, the picture of the future as I have drawn it may seem rather dismal for the United States. It is true that some other countries may have a moderate cost advantage over the United States for a decade or two because supplemental liquid fuels will cost more than petroleum. But it happens that the United States is blessed with about half of the oil shale and coal of the world. So, if we feel we must worry about the future, we should concentrate on the few decades of transition, starting before 1970, when we shall have less petroleum while the rest of the world has more. Since the whole world eventually must depend upon supplemental fuel, between 1970 and 2000 we shall have to devote more attention to efficient use of liquid fuel in its unique applications—motor fuel, for instance—and to manufacture of liquid fuels from oil shale and coal. If we do these things, the picture will not be dismal at all.

As late as 1950, it was predicted that the largest advance in future sale of liquid fuel would be for uses competitive with solid fuel—burning under boilers. This prediction now seems contrary to the trend of fuel technology. It also is contrary to statistics since 1950. Except for ships' bunkers, residual fuel oil gradually should disappear as a fuel and should be converted, instead, into distillate fuels such as gasoline and oils for diesel and jet engines. Economics will take care of this, because liquid fuels will cost too much to be used in competition with solid fuels or natural gas. In years to come, we shall look back on present fuel practices with mild amazement.

Fortunately, we now know how to convert residual fuel oil to premium products. The technological stage is set and the curtain will rise when economics permits. This should come before any substantial amount of coal conversion and, when widely practiced, should cut down on demand for petroleum.

The next development will be oil from shale. This, like conversion of residual oil, now is near profitability. A small rise in the cost of crude petroleum will be enough to bring commercial operations to Colorado. Even so, it seems doubtful that production of shale oil ever will provide a substantial part of our liquid fuel. Moderate rate of production will be at fairly moderate cost but high rate of production may be uneconomic.

The last and most permanent stage of liquid fuel development will be the conversion of coal. This will give the most expensive but most abundant liquid fuel if total conversion is carried out by the Fischer-Tropsch process or by hydrogenation. But such processes are wasteful.

However, if liquid fuels are made as by-products of electric power generation through low-temperature carbonization of coal and consumption of char as boiler fuel, the combined operation should be less wasteful of Btu's and should yield lower-cost liquid fuel. The volume that could be provided would depend on the relative markets for liquid fuel and electric power and on the proportion of liquid-fuel demand to be supplied in this way.

If all of our present electric power, except that provided from hydro plants, were to come from the combustion of low-temperature char, we would obtain as a by-product only a few percent of present consumption of liquid fuel. At present, this would be more than enough. As for the future, demand for electric power is rising more rapidly than demand for liquid fuel. Thus the proportion of our liquid fuel requirements that could be provided in this manner should become steadily greater as time goes on. Extrapolation of present trends indicates that rising potential production of by-product liquid fuel might be nearly enough to balance supply with demand.

SYNTHETIC FUELS EMERGING

Fig. 4 indicates the way in which our supply of distillate fuels may be provided over the next two decades. Such a break up is a risky thing to attempt and it may look quite absurd later on, for it assumes so many circumstances that can only be guessed at today. But planning for industry must involve some sort of future picture, even if it is faulty. As years pass by, the faults will cast their shadows before. The picture can be continually revised and, if necessary, redrawn, but Fig. 4 may provide a suitable starting point.

For total supply of distillate fuel, Fig. 4 assumes that demand will be 80% of predicated demand for crude petroleum. For shale oil, it is assumed that production will start before 1960 and will grow slowly to about 0.3-billion barrels per year in 1970. For coal conversion, it is assumed that operations will start soon after 1960 and will grow rapidly to 1.7-billion barrels in 1970. For domestic production, it is assumed that conversion of residual fuel will be under way before 1960 and will be virtually complete by 1970, thus bending the domestic-production curve toward the horizontal. Finally, it is assumed that imports of petroleum will continue to increase to a maximum of 1.3-billion barrels after 1960 but will have decreased by 1970 to about 0.8-billion. If we can produce more petroleum and import more, our dependence on coal will be less and the time-table for coal conversion will be delayed. Besides, higher fuel costs may slow down the rise of fuel demand. These are only a few of the things that may go wrong with Fig. 4.

HOW COSTS SHAPE UP

Thus far, I have said little about costs. One interesting thing, however, is that in a static economy, petroleum requires a minimum of capital outlay and operating cost compared with supplemental liquid fuels. To maintain constant production, we need only maintain a constant proved reserve. But in an expanding economy, it is necessary to prove up about 12 bbl of additional reserve for every barrel of increased production. The reason for this is that rate of production must be only about one-twelfth of proved reserve.

In the United States, it has been necessary for proved reserves to increase at a far greater rate than production. This sometimes is mistakenly cited as a reason for optimism but it also is an explanation of the high cost of petroleum discovery. The element of petroleum cost that is increasing most rapidly is discovery, and this cost is being magnified by expansion of demand.

Estimated costs for distillate fuels from oil shale are only a little higher than costs for distillates from petroleum. Before 1960, the costs may be equal. Distillate fuels from coal now would cost two to three times as much as from petroleum but the relationship should change rapidly after 1960 not only because petroleum costs will be rising but also because coal-conversion technology will be improving.

This portrayal of the future in rather definite terms is not without its elements of uncertainty, the most obvious of which have been pointed out. As time goes on, the uncertainties gradually will be resolved.

TYPICAL BUSY SCENE at the new Keeley No. 3 mine shows high-capacity earthmoving equipment cutting down 30 ft of loose overburden before the drilling and blasting cycle. Coal is removed to a 75-ft highwall before augering begins.

Augering Supplements Stripping

How Keeley Construction Co. mines to a 75-ft highwall with standard construction equipment and recovers 210 ft of coal with a high-capacity auger at No. 3 mine, Clarksburg, W. Va.

THREE OUTSTANDING FEATURES characterize stripping operations at the new Keeley No. 3 mine of the Keeley Construction Co., located on Coburn Creek near Clarksburg, Harrison County, W. Va.:

1. Stripping to a 75-ft highwall with standard construction and earthmoving equipment.

2. Auger mining 210 ft of coal with a 52-in auger.

3. Recovering, crushing and stockpiling limestone from the overburden.

By A. F. FLOWERS

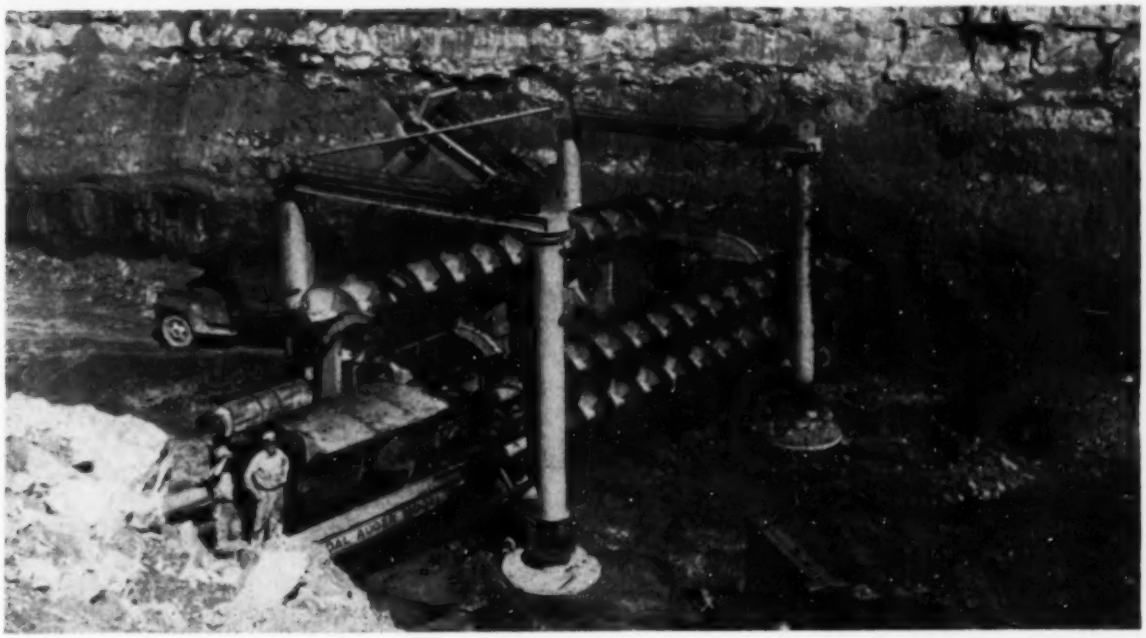
Assistant Editor, Coal Age

Stripping operations at the present site were started in May, 1952, in an area that had been previously mined to a 25-ft highwall. Coal loading began June 27 and the Compton Model 56 highwall auger was set up in August. The first auger coal was mined Aug. 26. Combined production from stripping and augering is currently 2,400 tons per shift.

Headquarters for the Keeley Construction Co. mining and construction organization are located immediately outside of Clarksburg, W. Va., where J. P. Keeley Jr., president and treasurer, has his office. Other officials are O. L. Billingsley, vice president; S. D. Griffith, vice president and assistant treasurer; R. L. Billingsley, secretary; and H. G. Schimmel, general superintendent. J. P. Dolan is superintendent at the Keeley No. 3 operation; Orville Johnson is pit foreman; and Lawrence Wildman is shooting foreman.

Operations at Keeley No. 3 are in the Pittsburgh seam which averages 6½ to 7 ft in thickness. The coal

STRIP MINING to a 75-ft highwall with standard construction equipment and recovery of limestone for road building are featured at Keeley No. 3.



AUGER MINING supplements production from strip pit by adding better than 700 tpd to Keeley No. 3 output. A 4-man crew handles the operation, moving and setting up the unit. Each maximum-depth auger hole yields about 125 tons.

outcrops about 250 ft above the valley floor near the top of the mountain. In some instances the top of the coal is irregular and special methods are required to remove fine dirt before the coal is loaded. The coal is relatively uniform in thickness and presents no unusual problems in loading. Overlying the coal is a 6- to 10-ft layer of soft gray shale. A hard bed of limestone, about 10 ft thick, covers the shale and is the source of material used to make crushed rock for road building. Shales of varying hardness extend 30 ft above the limestone. The remaining 30 to 35 ft of cover consists of earth, hardpan and softer material which can be removed with earthmoving equipment.

REMOVING THE OVERBURDEN

Overburden removal at Keeley No. 3 is a fourfold process developed by Keeley management to permit efficient stripping with equipment used on construction jobs, such as, railroads, airports, highways and bridges. Applying the knowhow learned from many years experience in the construction business, Keeley Construction strips to a 75-ft highwall at No. 3 mine.

Here's how Keeley Construction does the job:

Step 1—Dirt and soft shale are removed to a 30- to 35-ft highwall by earthmoving equipment consisting of 24-cu yd Gar Wood scrapers pulled by Allis-Chalmers HD 19 tractors, Le Tourneau 16-cu yd Carryalls pulled by Caterpillar D8 tractors, and La Plante-Choate TS 300 motor scrapers. A Le Tourneau rooter works with the earthmovers and loosens the overburden to speed loading.

Material removed by these units is wasted over the hill below the outcrop. Normally, five units are assigned to this job, but the number is increased or decreased depending upon the demand for some of the units on construction work and the speed of stripping desired.

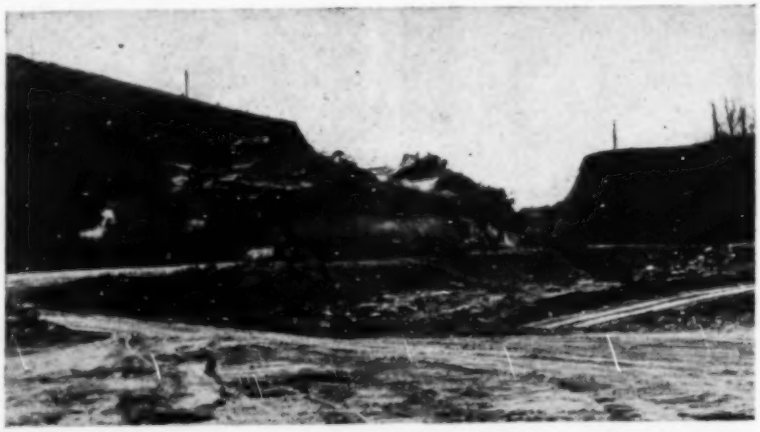
Step 2—After overburden has been removed down to hard rock, a truck-mounted McCarthy horizontal drill bores 6-in blastholes in the shale overlying the limestone. These are drilled 6 ft above the base of the shale and on 30-ft centers. Average depth of holes is 48 ft. Auger sections are 6-ft long and the cutting head is equipped with Parmanco bits.

Each hole is charged with 100 to 300 lb of 5x28-in du Pont 40% dynamite and primed with an electric blasting cap. Approximately 12 to 15 holes are detonated in each blast.

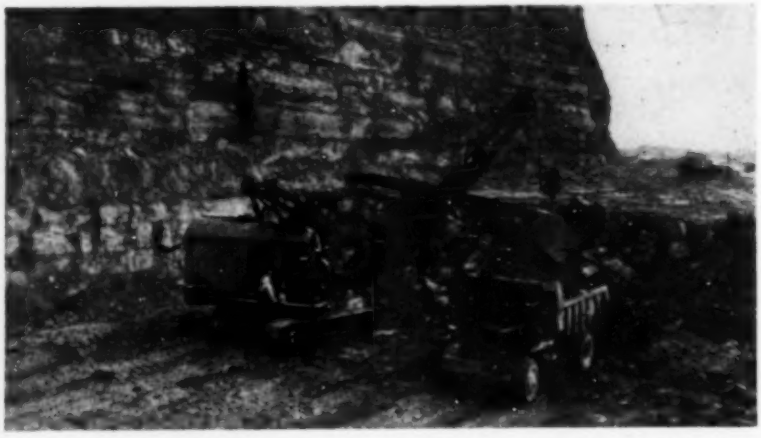
Two Northwest Model 80D diesel-

INITIAL CUT is made by earthmoving equipment removing 30 to 35 ft of soft material and wasting it downhill. A rooter loosens the overburden.

How Keeley Uses Varied Equipment



BLASTING of shale above the limestone with 40% dynamite precedes removal by shovel and trucks. About 12 to 15 holes are set off in each blast.



ALTERNATE METHOD is used when limestone is not recovered. Both limestone and shale are loaded into trucks and hauled to the spoil area.

HORIZONTAL DRILLING of shale is by truck-mounted unit. Holes, 6-in in diameter, are drilled 48 ft deep on 30-ft centers. Auger sections are 6 ft long.

to Strip to a 75-Ft Highwall

REMOVING 30 FT OF SHALE over the limestone is a job for diesel-powered shovel and trucks. Nine units carry rock to the spoil area.

REMOVING SHALE OVER COAL is a job for shovel and bulldozer. Shovel casts bulk of material to downhill side while dozer pushes fine material.

powered shovels equipped with 2½-cu yd dippers load 14-cu yd Euclids with shot rock. Nine of these haulage units, working on top of the unshot limestone, carry rock from the pit and dump it over the hill away from the active stripping area.

Step 3—Breaking, loading and stockpiling of the limestone beneath the shale follows when sufficient area has been uncovered. A 2-man crew using a Gardner-Denver Model D8,800 air compressor and Ingersoll-Rand drill wagon with a percussion drill bore 1⅞-in vertical holes on 4-ft centers in the uncovered limestone. Holes are drilled 12 ft deep and are charged with 1¼x8-in du Pont 40% dynamite. About 700 to 800 cu yd of limestone is drilled per shift.

A Lima Paymaster shovel with a ¾-cu yd dipper loads the shot rock into two International 3-cu yd trucks which haul it to a stockpile. There a Michigan T6K crane, swinging and dropping a 2,500-lb steel ball, breaks the large blocks into pieces that can be handled by the rock crusher. The broken rock is loaded into two Ford trucks which shuttle back and forth from the stockpile to crusher. When the limestone stockpile is depleted, the crane moves to the stripping area where the rock is being prepared and breaks the rock before it is loaded into trucks. These trucks then haul directly to the crusher.

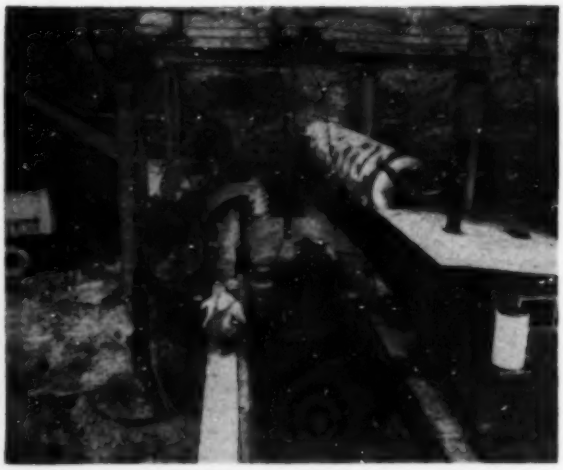
Step 4—A Northwest D80 shovel and Caterpillar D8 bulldozer remove the shale beneath the limestone to within several feet of the coal. A scraper then removes the remaining rock from the top of the coal.

When sufficient uncrushed limestone has been stockpiled, an alternate method of handling the limestone and underlying shale is used. The McCarthy horizontal unit bores holes in the shale several feet below the base of the limestone. These are charged and fired similar to the other holes drilled over the limestone. The mixture of limestone and shale is loaded into trucks and hauled to the spoil area.

Cleaning fine rock from the top of the coal is an important three-stage operation at Keeley No. 3. First, a Caterpillar No. 12 road grader scrapes the fine loose rock from the top of the coal. A LeRoi Tractair rubber-mounted unit then sweeps the top of the coal. Final cleaning of any remaining dirt is done by a crew of men who load it into a truck for removal to the spoil area.

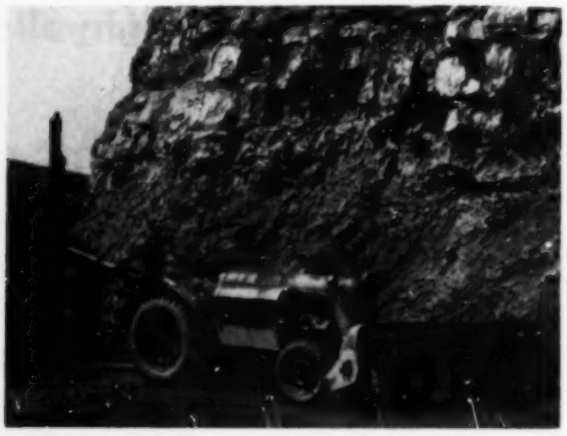
If the limestone over the area where coal loading is being carried out is recovered and stockpiled, the coal

HIGH-CAPACITY AUGER bores 52-in holes 210 ft deep after strip mining is finished. Dozer moves auger and cleans pit for next auger setup.



BUILT-IN AUGER RACKS hold 35-ft auger sections. Hydraulic hoists at the top of drill frame handle sections between racks and operating carriage.

COAL CLEANING begins in the pit where a motor grader scrapes loose dirt from the top of the seam.



COMBINATION SWEEPER AND DRILL UNIT cleans top of coal after motor grader completes the scraping job.

Keeley Stresses Thorough Coal Cleaning in the Pit

UNCOVERED LIMESTONE is drilled on 4-ft centers by percussion drill receiving air from portable compressor.

CRANE BREAKS LARGE BLOCKS at the stockpile by dropping a 2,500-lb steel ball. Crusher makes final reduction.

must be drilled and shot prior to loading. The Tractair unit with drill-boom mounted on the rear and built-in air compressor moves in and performs this operation.

When the limestone is not recovered, the force of the explosive used in the shale under it is great enough to loosen the coal so that the power shovel can load it.

A Northwest Model 6 diesel-powered shovel, 1½-cu yd capacity, loads coal into a fleet of 12 hired trucks which haul it 4 mi to the tipple.

HIGH-TONNAGE AUGERING

As soon as sufficient territory had been stripped, a Compton coal auger was put into production to recover coal beyond the 75-ft highwall. The new unit is a Model 56 with a 52-in cutting head and 48-in-diameter auger sections. Each auger section is 35-ft long and is handled from storage rack to working position by hydraulic hoists mounted at the top of the auger frame.

A 4-man crew handles all duties in the augering process. One man operates the diesel drive unit; another handles the hydraulic system and discarge chute; a third man performs general duties, such as adding or removing auger sections and changing bits in the cutting head; and the fourth man operates an Allis-Chalmers HD19 bulldozer which moves the auger to new hole locations and performs cleanup work in the pit. Haulage to the tipple is contracted to responsible truckers.

Production from the unit averages 72 tons per shift hour, or better than 700 tons per 10-hr shift. This includes time consumed in moving the auger to new hole locations, setting up, augering, and adding and removing auger sections. Single holes on 5-ft centers are auger mined to a maximum depth of 210 ft. Each maximum-depth hole yields about 125 tons of coal.

COAL LOADING is handled by a 1½-cu yd shovel. Trucks travel on top of coal. Men in background use shovels to load dirt missed by grader and sweeper.

➧ and Recovers Limestone in Cover

PORTABLE CRUSHER and screening unit reduces broken limestone to 2x0 size and delivers it to a steel bin for removal to a nearby stockpile.

PREPARATION

Strip and auger coal is dumped into a 30-ton steel bin. From here a reciprocating feeder delivers the coal to a pan conveyor which carries it to the picking table. A bar screen with 1½-in openings removes the minus 1½-in material as the R-O-M coal is delivered to a McLanahan & Stone adjustable single-roll crusher where it is broken to various sizes down to 2-in, remixed with the minus 1½-in slack, and passed directly to railroad cars. An alternate path is to send it to a 30-in belt conveyor for delivery to a single-deck classifying screen. Products of this screen are ¾x0, 1x0, 1¼x0 or 2x0 slack, and nut and egg sizes. Additional handpicking is done on the classifying screen and in the railroad car to remove any refuse not taken out in the initial picking.

ROCK CRUSHING

To provide crushed rock for road building, Keeley Construction has a Telsmith completely portable rock-crushing and screening unit set up adjacent to the strip pit. Limestone from the stockpile or direct from the pit is dumped into a 5-cu yd hopper feeding an 18x32 primary jaw crusher. The minus 5-in product passes to a 30-in belt conveyor discharging to a 24-in belt feeding a 4x10-ft shaking screen. Here it is separated into plus and minus 2-in fractions. The oversize flows to a 28-in intercone secondary crusher and is recirculated to the 24-in belt for delivery to the sizing screen.

Underproduct from the screen is delivered to 10x18-ft prefabricated steel bin via an 18-in Barber-Greene belt conveyor. A truck hauls from the bin to a nearby stockpile where the limestone is stored until it is needed for road building.

Two UD18 International diesel engines, each driving one of the crushers plus some of the auxiliary equipment, furnish power for the portable 75-tph crushing unit. The entire plant can be torn down in one day and can be reassembled on a new site in two days.

Two men handle plant operations, one man stockpiles crushed rock, two men haul rock to the crusher, and one man loads uncrushed stone into trucks for delivery to the crushing plant.

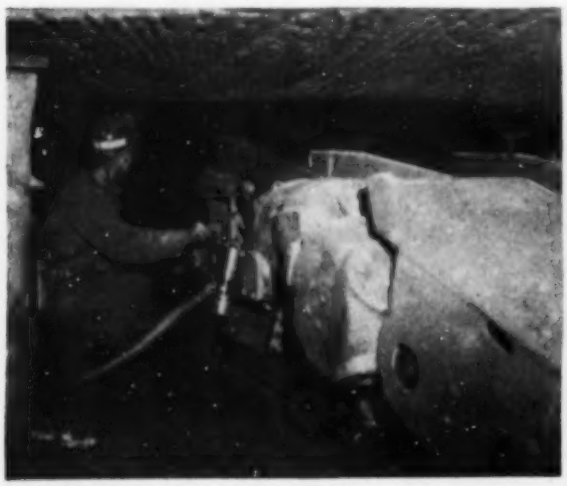
MACHINE MINING STERLING'S 5-man machine-mining crews achieve an average productivity of 20 tons per man shift from central Pennsylvania's B seam. The operator in the photo controls the car-spotting hoist as the shuttle-car load is discharged.

"Second Wind" for Sterling No. 1

Getting set for the long pull, Sterling Coal Co. streamlines mining methods, mechanizes production and service operations, builds a new portal and works hard at the job of increasing safety.

By HAROLD DAVIS
Assistant Editor, Coal Age

KEEPING IN STEP in coal's march toward tightened-up operations for higher efficiency, operating officials of



OFF-TRACK UNITS, including loading machine, universal cutting machine and shuttle car, work mechanized sections.

ELEVATING CONVEYORS load 3-ton steel mine cars in conveyor sections where 7-man crews work rooms in pairs.

CONVEYOR MINING IN CONVEYOR SECTIONS, mother conveyor receives coal from two room conveyors and discharges to a cross conveyor which feeds single loading point.

the Sterling Coal Co., Elmora, Pa., now are wrapped up in the project of modernizing their No. 1 mine. Sparked by D. J. Keenan, general superintendent, the program includes:

1. Streamlining production methods through the use of loading machines and shuttle cars in some sections and conveyors in others.

2. The adoption of carefully planned layouts to further increase the value of mechanization.

3. The construction of a new man-shaft which will be equipped with an automatic elevator.

4. The use of shovel-action loading machines for loading-out bottom rock in haulage entries.

5. The modernization of auxiliary services, such as, drainage, power distribution, road cleaning and communications.

Operations at Sterling No. 1 are in the 42- to 48-in Lower Kittanning (B) seam in northern Cambria County where the B seam is low in ash and sulfur and makes an excellent steam coal. Over the coal is a layer of boney from 4 to 8 in thick which is normally timbered and left in place. It is taken down and loaded out, however, if it shows any signs of weakness. In some places the bottom consists of about 4 in of rock underlain by 8 in of coal. In other places the bottom is double-ply, having two thin layers of rock interbedded with two thin layers of coal. These thin layers are left in place in either case. In still other places the bottom is hard fireclay.

MINING METHODS

All openings in the panel-system operations at No. 1 are driven according to a master plan, even in those places still operating on a hand-loading basis. This makes possible a smoother transition to machine mining as mechanical units are added. Haulage and supply-handling are better systematized, and the present level of efficiency in hand, conveyor and mechanical sections is held at a peak.

Here are the major features of the master plan:

The main opening into the newer solid sections is a 7-heading main entry driven off the main haulageway. Maximum haul distance from the new sections is approximately 4 mi.

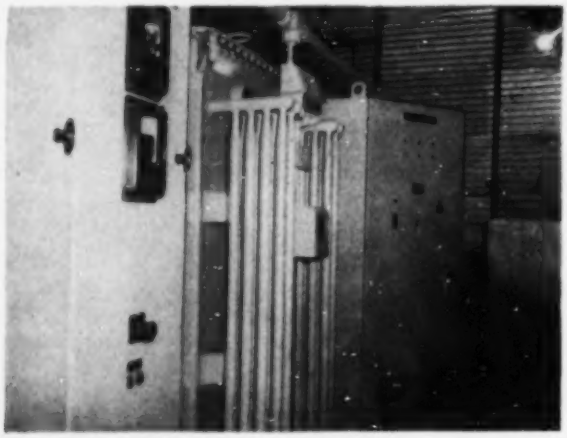
Main butt entries (seven headings) are turned from the main openings on 2,000-ft centers and are driven to the property limits, a maximum length of 3,800 ft in some instances. Panel entries, three headings each, are turned from the butts on 700-ft cen-

TWO SHOVEL-ACTION LOADING MACHINES load haulage-entry bottom rock in all sections at Sterling No. 1.

SHAKING CONVEYORS are used in rooms. Mother- and cross-conveyors are chain-and-flight units.

LUBRICATION of the equipment is done on the section by the mechanic who serves two mining units.

MINE PHONES, promoting smoother haulage, are standard on six gathering and four main-haulage locomotives.



THREE SUBSTATIONS with 300-kw mercury-arc rectifiers provide 250-v DC power through boreholes to load centers.

T. J. LAMONT, assistant superintendent, demonstrates sliding-panel display of all mine maps.

ters and are driven 1,800 ft long. All these openings are 15 ft wide on 50-ft centers with breakthroughs 100 ft apart.

Rooms are driven 20 ft wide on 50-ft centers from both sides of the panel entries—to the right side as the panel entries are advanced and to the left as they are brought back. In both instances, room pillars are extracted immediately, leaving only the chain pillar along the panel entry which is recovered with the entry pillars. Thus, the airways are protected throughout the life of the panel.

MECHANIZED MINING

Although conveyor mining is a form of mechanized production, the latter term as used in this article will apply to units employing a machine to lift the broken coal from the floor and discharge it to the intermediate haulage equipment. Conveyor mining will be described later in the piece.

Two mechanized units with 5-man crews now are operating at Sterling No. 1, with each unit equipped with a Joy 14-BU loading machine, a Joy 11-RU cutting machine, a Joy 6-SC shuttle car and a Chicago-Pneumatic hand-held drill. The 5-man crew includes a loading-machine operator, helper, cutting-machine operator and helper and shuttle-car operator. One supervisor is in charge of both units and one mechanic serves both.

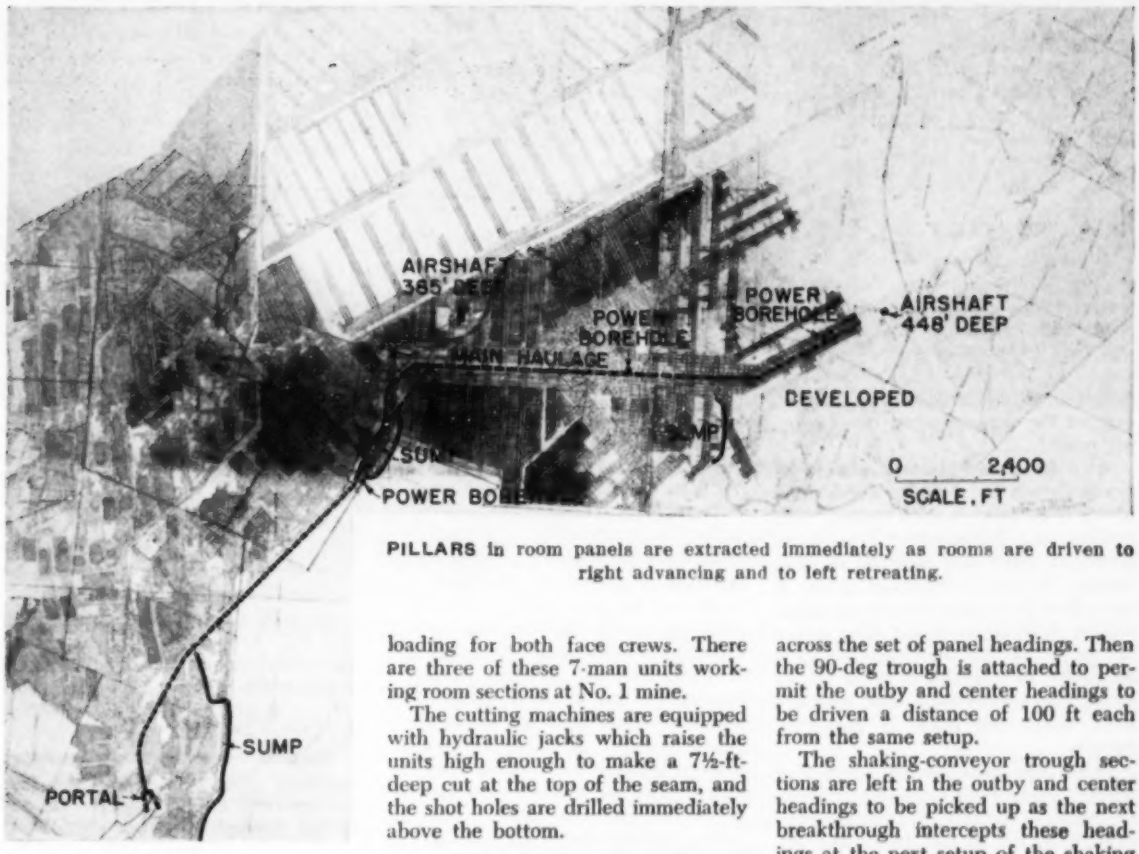
Both units work three shifts per day. In development and room work the section is planned to provide five working places, from which an average of four cuts per shift are loaded out for a productivity of 20 tons per man-shift.

The normal face cycle is as follows:

The universal cutting machine, 9-ft bar equipped with Sulmet bits, makes a top cut under the boney roof. The cutting-machine operator and his helper then drill four or five shot holes, as necessary, about 6 or 8 in above the bottom, and charge the holes with Atlas Coalite L. When the cut has been dropped the loading machine moves into the place to load the coal into the single shuttle car. In the meantime, crossbars have been set on 4-ft centers.

Shuttle cars are equipped with elevating-discharge conveyors, making it possible for the buggies to load directly into the mine cars in the center panel heading. The buggy operator controls car spotting by means of a push-button station he can reach from his seat in the car. The push buttons control a Brown-Fayro Model K car-spotting hoist.

The 2-ton end-dump steel mine cars, made by Bethlehem and Irwin, are gathered into 60-car trips to be hauled to the surface over 30-lb rail in the panel entry, 60-lb rail in the butts and 70-lb rail in the main opening.



PILLARS in room panels are extracted immediately as rooms are driven to right advancing and to left retreating.

CONVEYOR MINING

From long acquaintance with conveyor mining, Sterling officials have developed methods which are economical in both manpower and equipment, thus making a major contribution to productivity that averages 15 tons per man-shift.

Rooms are driven and retreated in pairs by seven men, three men in each room and a boom man at the loading point. Basic equipment for this crew includes two shaking conveyors, one 300-ft mother conveyor (chain), a chain cross conveyor, an elevating car-loader, all LaDel, two Jeffrey 35-BT cutting machines and two Chicago-Pneumatic electric coal drills. The cutting machines and drills use Kennametal bits.

The haulage track, as usual, is laid in the center heading of the panel entry while the 300-ft mother conveyor is set up in the adjacent heading to span six room necks, thereby making it possible for a single-mother-conveyor set-up to serve three moves of the room shakers. The cross conveyor takes coal from the mother conveyor through a breakthrough to the elevating conveyor at the loading point, where one man does the car-loading for both face crews. There are three of these 7-man units working room sections at No. 1 mine.

The cutting machines are equipped with hydraulic jacks which raise the units high enough to make a 7½-ft-deep cut at the top of the seam, and the shot holes are drilled immediately above the bottom.

DEVELOPING WITH CONVEYORS

Panel entries in conveyor sections are driven by 4-man crews, three at the face and one at the car. Their operations also are designed for maximum economy of equipment and manpower.

Basic equipment for a conveyor development crew includes an elevating conveyor, a cross conveyor and a mother conveyor, all chain-and-flight units, and a shaking-conveyor assembly which is moved forward with the advancing work. Shaking-conveyor accessories include 300 ft of straight trough and a 90-deg trough, and the equipment list is rounded out with a 35-BT cutting machine and a CP coal drill.

The mother conveyor is installed in the inby heading as it is driven to keep the center heading free for the rock-lifting and tracklaying crews. The elevator and cross conveyor are installed in a breakthrough between these two headings to transport coal from the mother conveyor to the loading point in the fully-completed outby portion of the center heading.

The shaking-conveyor drive unit is set up at 100-ft intervals in the "mother-conveyor" heading to drive 100-ft-long breakthroughs straight across the set of panel headings. Then the 90-deg trough is attached to permit the outby and center headings to be driven a distance of 100 ft each from the same setup.

The shaking-conveyor trough sections are left in the outby and center headings to be picked up as the next breakthrough intercepts these headings at the next setup of the shaking conveyor.

The shaking-conveyor drive unit is pulled up the inby heading from one setup to the next by means of the cutting-machine rope. The only accessories that need be moved up are the 90-deg trough and 50 ft of straight trough. The necessary trough sections for the 100-ft advance from the next setup are recovered through the new breakthrough from the previously driven sections of the outby and center headings.

TAKING BOTTOM ROCK

Sufficient bottom rock is taken up in the main entry to provide 6-ft clearance over the rail. In the butts, clearance is 5 ft over the rail. The rock work in all sections is done by two 3-man crews. Their equipment includes a Myers-Whaley track-mounted loading machine, a portable Ingersoll-Rand air compressor and a JB-4 pneumatic drill.

Normal procedure is to break up about 200 ft of rock to provide a worthwhile loading run for the Myers-Whaley loading machine. The vertical blast-holes are drilled only deep enough to provide the required clearance.

The rock work is carefully sched-

uled to prevent interference with coal production, and in the loading phase of the work, mine cars are placed one at a time by a gathering locomotive.

Road cleaning in all tracked openings is done by a Canton road-cleaning machine, with Canton car transfer used to speed car change close to loading point.

HANDLING WATER

Virtually peakless pumping is a feature of Sterling's water-handling system, which includes a series of three large sumps isolated by dams and two pumping stations each operating on a 12-hr duty cycle. The sumps act as accumulators in smoothing out the demand curve for pumping power.

A 1,400-gpm Morris centrifugal pump driven by a 50-hp Louis Allis motor is installed in each station, with continuous independent pumping power at 440 v AC supplied to each station through a borehole cable. A secondary pumping station is equipped with a 1,200-gpm Flood City pump driven by a 40-hp Westinghouse Type SK motor. In addition, 67 other pumps in capacities from 30 to 500 gpm are used about the mine in gathering service.

Main pipe lines are constructed of wood-pipe sections supplied by Peter O. Sutphen, Everett, Pa., in diameters of 4, 6, 8, 10, 12 and 16 in, and the water-exposed parts of the pumps are made of bronze.

Total discharge from the mine is about 3,000 gpm which is moved through three stages over a distance of 3½ mi. Wherever possible, gravity flow is utilized to further increase the economy of water-handling.

EFFICIENT AUXILIARY SERVICES

Gathering haulage is done by six 10-ton locomotives, five Westinghouse and one Jeffrey. Mainline haulage is done by four Westinghouse locomotives, two 22½-ton and two 18-ton. Because of adverse grades along the main haulageway, each trip of 60 cars, the usual number for a trip to the surface, requires two locomotives, one at the head end and one pushing. A passing track is provided about midway in the 4-mi main haulageway to eliminate haulage tie-ups.

All locomotives are equipped with MSA MinePhones which are interconnected with each other and with a dispatcher's phone at the surface weighing office. A block-signal system provides further control.

Power is purchased from Pennsylvania Electric Co., and is carried over the property at 11,000 v AC on Sterling-owned pole lines having third-wire overhead ground protection. High-voltage AC is stepped down and converted to 250 v DC for underground use at three surface substations equipped with 300-kw Westinghouse Ignitron rectifiers. The DC power is fed through borehole cables to underground load centers, with 1,500-amp Ohio Brass switches serving as disconnect switches at the foot of each borehole. Mechanical-mining units are served through Mines Equipment Co. distribution centers. A 200-kw Ridgway m-g set at the portal serves as a booster for main-haulage power.

Power lines in the main entries consist of No. 9-section trolley wire and 1,000-MCM feeder. Butt entries are served with 4/0 trolley wire and 500-MCM feeder, and panel entries are fed through No. 9-section trolley wire.

Ventilation is provided by a 72-in LaDel fan, exhausting 129,000 cfm at a water gage of 3.1 in. The fan is installed at one of the two field airshafts on the property.

In producing sections, one of the three panel headings is driven through to the outby butt entry to provide a bleeder for the active workings. The bleeder is kept open all the while a panel is active and the outby butt-entry pillars are not robbed until the inby panels are worked out. The air is coursed through active places in such a manner that pillar falls are on the return side.

Sterling Management

New York Office

President: Col. Robert B. Baker
Vice President: Ralph R. Adams

Philadelphia Office

Assistant to President: J. A. Bradley
Executive Vice President: J. W. McGinn
Secretary-Treasurer: T. F. Minton
Assistant Treasurer-Purchasing Agent: T. G. Guiniven

EL MORA (PA.) MINE

General Superintendent: Dennis J. Keenan
Assistant Superintendent: Thomas J. Lamont
Chief Electrician: John H. Buck
Chief Engineer: Charles Schlicher
Mining Engineer: William Kelly
Safety Engineer: J. E. Lamont
Mine Foreman: Joseph Golgosky
Construction Engineer: Adrian Buck
Secretary to the General Superintendent: Ruby G. Williams
Assistant Secretary to the General Superintendent: R. L. Hannigan

NEW SERVICE FACILITIES

A new combined manshaft and field airshaft now is under construction with Oct. 1, 1953, completion expected. It is to be a 2-compartment 11½x20-ft shaft divided by a brick curtain wall to serve the area where most of the machine mining now is done. The intake side of the shaft will be equipped with an Otis automatic elevator and the upcast side will be capped by a Jeffrey Aerodyne Type 8H-72 exhaust fan. The new installation also will include a washhouse, lamphouse, first-aid and mine-rescue station and foremen's office.

A new shop and motor barn on the surface near the portal has contributed to better performance by the machines and has led to the initiation of a controlled system for handling maintenance supplies and keeping a running inventory. Furthermore, a new oilhouse and a sandhouse have been recently completed to eliminate unnecessary materials handling.

All told, the improvements at Sterling No. 1, including the new shaft and elevator, represent an investment of about $½ million to give the property its second wind for the 40-50-yr life ahead of it.

Portable rock-dusting machines, made by American Mine Door Co., are mounted on the shuttle cars and driven through a power take-off to apply rock dust within one cut of the face, and more rock dust is applied by hand, as necessary. MSA high-pressure rock-dusting machines are used on main haulageways. Each of the machines in the mine is equipped with a Presto chlorobromethane-filled fire extinguisher.

Also in the interest of safety, the men and officials at Sterling No. 1 are active in such regional organizations as the Joseph A. Holmes Safety Association, the Northern Cambria Mining Institute, and in the state inspection district emergency organization in cooperation with other companies in the vicinity. The emergency organization is set up to swing into action if any mine in the area finds itself in trouble. At a moment's notice, the various committees will round up expert counsellors, trained rescue workers and rescue apparatus.

Sterling officials take an active interest in their committee assignments within the emergency organization and a number of employees are trained in mine-rescue techniques and the use of McCaa apparatus, Chemox, all-service masks and related equipment. Furthermore, the company always is represented by trained first-aid teams at the contests of the Central Pennsylvania Safety Association.

Johnstown *Tribune-Democrat* photo

1887—ARTHUR J. DUKES—Pennsylvania

1899—JOHN AUGUSTINE WILLIS SR.—West Virginia

The Half-Century Club

THREE ADDITIONAL EXECUTIVES whose contributions to coal mining go back 50 yr or more have been nominated to the *Coal Age* Half-Century Club since publication of the initial list of seven in January, 1953. *Coal Age* will welcome additional nominations of any man with 50 yr or more of service and still active in a supervisory or managerial capacity.

1887—Arthur J. Dukes

Operator, Stone Bridge Coal Co., Cresson, Pa.

HEADING TOWARD 80, Mr. Dukes came over from England with his brother in 1887 and started work at Laurel Run, near Osceola Mills, Pa., at the age of 14 trapping and then helping his father, who was killed by a fall that caught both of them when Arthur was 15. His next job was at the old Lancashire No. 2 mine, with others in succession as follows: Mitchell mine, later Pennsylvania Coal & Coke No. 10; Lancashire No. 3, prospecting, shaft sinking, steam engineer and weighboss; Lancashire No. 6, machine runner; Lancashire No. 7, electric-plant operator; Patton, Pa., where he passed the examination for second-grade mine foreman; Garrett, Pa., where he became mine foreman in 1906 and in 1908 was the only man to pass the examinations for first-grade foreman and fireboss; Shoofly coaling station, Baltimore & Ohio; Beech Creek & Eastern, Mosscreek, Pa.; Peale, Peacock & Kerr, 1917; and Barr slope, in Indiana County.

Mr. Dukes was early active in safety and mine rescue, and his efforts to advance himself resulted in a correspondence degree in mining as a result of purchasing for $50 a $300 correspondence course given to a druggist in Cresson by a mining-equipment company in return for display space in a show window. Mr. Dukes took over Stone Bridge in 1929, and now runs it with the help of Mrs. Dukes and two sons, Joe and Steve. Some 15 miners are employed and annual production is around 17,000 tons.

1899—John Augustine Willis Sr.

President and General Manager, Coalburgh-Kanawha Mining Co., Coalburg, W. Va.

OPERATING one of the three oldest bituminous mines and one of the two oldest in West Virginia, Mr. Willis entered the industry in 1899 as an electrician for the Keys Coal Co., Mammoth, W. Va. In 1905 he moved to the Winifrede Coal Co. as electrician and assistant to the superintendent, changing again in 1907 to the Coalburgh-Kanawha Coal Co., as superintendent. Thus, by 1907, he had become connected with two companies operating mines opened in 1853 and still operating in 1953 (*Coal Age*, March 1953). In 1909, he received the degree of A. B. in Engineering from West Virginia University.

When Col. William Henry Edwards, who acquired the coal and opened the original mine in 1853, died in 1916, Mr. Willis organized the present company. In 1924, he bought the land and the shares of the other stockholders to make the company a family interest. He leased the mine in 1937 to another company, but took it back 3 yr and has operated it since that date. His son, J. A. Willis Jr., a mining engineer, is vice president and general superintendent.

1901—C. M. Watt

Consultant, Loyal Hanna Coal & Coke Co., Philadelphia, Pa.

ENJOYING THE DISTINCTION of having worked for only one organization—Loyal Hanna and other companies which were or still are associated with it—Mr. Watt joined up within two weeks after leaving college. He was elected assistant general manager in 1908, director in 1916, general manager in 1918 and president in 1936. He resigned as president April 22, 1953, but is staying on as consultant to assist the new president until retirement Oct. 31, 1953, after 1 mo less than 52 yr with the Loyal Hanna organization, operating in Somerset County, Pennsylvania.

Coal for Electrodes

What the market is in the aluminum industry and what can be done to make coal suitable for it.

By ROBERT J. CAMPBELL JR., chemical engineer; CLARENCE L. BOYD, chemist; and R. JOHN HILTON, former chemical engineer, U. S. Bureau of Mines, Region II, Seattle, Wash.

A POTENTIAL MARKET for 1½ million tons of high-purity coking coal is virtually untapped in the United States and only awaits development of suitable beneficiation methods. The field is aluminum reduction, which consumed over 500,000 tons of carbon in 1951. The record production in 1952 consumed 600,000 tons, and new facilities under construction should raise the total for 1953 to over 1,100,000 tons.

The Defense Production Authority goal was set at 1.7 million tons of aluminum per year by January, 1955. Since 1,275 lb of carbon is consumed per ton of aluminum produced, 1½ million tons of coal would have to be coked to supply the aluminum-industry's carbon requirements in 1955 if carbon from coal replaced other forms.

COAL'S CARBON ROLE

Anthracite at present supplies some material for cathodes, which have a life of about 3 yr. The real carbon consumer, however, is the short-lived anode, which removes the oxygen for alumina. Anodes for American aluminum-reduction cells generally are made from calcined petroleum coke bound with coal-tar pitch, though a few plants use a tar derived from petroleum.

Coke from coal can replace petroleum coke for aluminum-reduction-cell anodes. This is no idle dream, because chars and cokes from coal have been produced containing less ash than petroleum coke at the Northwest Experiment Station of the U. S. Bureau of Mines. Much more research must be done, however, to bring the process to a commercial reality.

The fact that superclean coke from coal is a satisfactory anode material is well demonstrated in European aluminum-reduction practice. In the English primary-aluminum industry, 83% of the carbon consumed in 1949 came from coal. Germany used large quantities of coke from coal for anodes during World War II. The principal objection to ordinary coal coke is the contamination introduced by the ash, the constituents of which are reduced in the electrolytic cell to form aluminum alloys.

BENEFICIATION METHODS

Three general methods of coal beneficiation appear possible:

1. Refinement of present-day washing practices to produce very low ash coal. This is the least expensive and is the procedure used by the English electrode-coke industry, which beneficiates two extremely clean coal deposits by froth flotation. The yields of superclean coal represent 20 to 40% of the raw coal, and the coke produced contains 0.8 to 1.0% ash. German flotation produced 0.8% ash coal, representing 27% of the feed.

2. Removal of the ash-forming material by dissolving it in acid or alkaline solutions. Coal from Baeswiler, Germany, after froth flotation, was extracted with a boiling solution of hydrochloric and hydrofluoric acids. The cleaned product contained 0.5% ash and represented 12.5% of the coal entering the plant.

3. Putting the coal substance into solution to effect separation of the undissolved ash-forming material. The highest-purity coke in Germany was produced by the Pott-Broche process, in which the coal was dissolved in middle oil from a hydrogenation plant. The product contained 40% volatile material and 0.17% ash. The coke analyzed 0.28% ash.

U. S. STANDARDS

The petroleum coke used by the United States aluminum industry has an ash content of approximately 0.35%. Other specifications limit the iron, silicon and alkaline-earth metals to low values and also require a high density. Obviously, coal must be specially prepared to meet these specifications.

The possibility of producing electrode-quality coke from very clean American coals was examined by Selvig and associates, of the Bureau of Mines, Pittsburgh, in 1943. None of the seven coals selected contained less than 1% ash, even in the cleanest sizes. The probability of successful beneficiation by mechanical cleaning was explored by specific-gravity analyses. It was found that only one coal contained less than 0.6% ash after separation at 1.27, and the others ranged up to 1.0% when similarly separated. Since present mechanical-cleaning methods cannot equal these ash contents, some additional purifying process will be required.

Research directed at the beneficiation of coal to meet electrode specifications has been resumed by the Bureau of Mines at Seattle, Wash., where work is done in cooperation with the School of Mineral Engineering, University of Washington. Experimental work has shown that acid leaching of a noncoking coal or solvation of a coking coal will produce a char or coke containing less ash than petroleum coke. These methods have not been developed beyond the laboratory scale, and additional research would be required before design of a pilot plant could be begun.

Table I—Ash Reduction, 48x0-Mesh Coal, by Chemical Leaching

State (1)	County (2)	Mine (3)	Bed (4)	Raw-Coal Ash,* % (5)	Float-and-Sink Yield, % (6)	Float-and-Sink Ash,* % (7)	Total Chemical Leaching Time, Hr. 1 Ash,* % (8)	2 Ash,* % (9)	4 Ash,* % (10)
Ala.	Jefferson	Prospect†	Clements	7.6	85.0	1.6	0.42	0.49	0.47
Ky.	Bell	Big Jim‡	Str. Creek	4.8	86.2	0.9	0.36	0.37	0.40
Ky.	Harlan	Black Mtn.†	Darby	4.9	75.9	1.4	0.50	1.9	0.60
Wash.	King	McKay‡	McKay	4.4	95.1	3.0	1.5	1.5	0.18
Wash.	Pierce	Wilkeson†	No. 2	16.2	65.0	6.3	1.7	0.60	1.7
Wash.	Pierce	Wilkeson†	No. 3	12.9	51.0	4.1	1.4	1.6	1.4
Wash.	Whatcom	Dis. Tunnel§	No. 1	8.1	30.0	2.4	1.6	1.6	1.7
W. Va.	Greenbrier	Duo†	Sewell	6.8	48.5	1.7	0.51	0.63	0.63
W. Va.	Greenbrier	Margarette†	Sewell	5.1	67.0	1.5	0.45	0.51	0.52
Wyo.	Sweetwater	Dines‡	Rock Spgs. 5	6.3	68.0	2.8	1.0	0.90	0.44

*Moisture-free basis. †Bituminous. ‡Subbituminous. §Semianthracite.

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MECHANICAL CLEANING

Coals from 10 mines in five states, differing in rank from semianthracite to semibituminous, have been examined. The ash contents of these coals, as received, ranged from 4.4 to 16.2%, as shown in Table I, Cols. 1 to 5. Mechanical-cleaning possibilities were investigated by specific-gravity analyses. None of the coals contained a fraction sufficiently low in ash to permit processing by mechanical cleaning alone.

CHEMICAL LEACHING

The assumption was made that a low-ash fraction from a washery would be used as the feed to a chemical-extraction plant. Specific-gravity analyses indicated that reasonable yields of fairly clean coal were obtainable by separating the bituminous and subbituminous coals at 1.30 and the semianthracite at 1.43. To simulate the product of such prior treatment, the coals were separated at the selected specific gravities before use in subsequent tests. The yields and ash contents of the float product are shown in Cols. 6 and 7, Table I.

Putting the ash-forming materials in solution was attempted by boiling the finely ground coal in various reagents for a predetermined time, then filtering and washing with distilled water. The coals then were leached with other reagents or were air-dried and analyzed for ash content.

The most-efficient slurry for leaching was found to be 12.5% coal by weight. The results of leaching 48x0-mesh coal, using three of the best procedures, are shown in Cols. 8, 9 and 10, Table I. The leaching methods were:

1 (Col. 8)—The coal was boiled 1 hr in a solution containing 2.1% hydrogen fluoride and 5.0% hydrogen chloride.

2 (Col. 9)—The coal was boiled 1 hr in 4.0% sodium sulphate, followed by 1 hr in 1.1% hydrogen fluoride and 4.3% hydrogen chloride.

3 (Col. 10)—This procedure required four separate 1-hr treatments. The coal was boiled successively in 4.4% sulphuric acid, 10% sodium hydroxide, 1.1% hydrogen fluoride, and 4.3% hydrogen chloride.

The data in Table I show that each method has an advantage for application to a particular coal. Method 1 appears to be the most promising as a general procedure, as it is effective on more coals and requires less treatment time. Big Jim coal from Kentucky cleaned by this process yields a coke containing 0.7% ash. This is the lowest figure obtained at this fineness from a coking coal but is too high to meet ash specifications for petroleum coke.

Table II—Coal-Ash Reduction by the Solvation Process

Coal	Starting Ash,* %	Cleaned-Coal Ash,* %	Coke Ash,† %
Margarette	1.5	0.20	0.28
Duo	1.7	0.35	0.48
Big Jim	0.9	0.47	0.79
Black Mountain 30	1.4	0.49	0.80

*Moisture-free basis. †Calculated.

The lowest ash of any product was found with the McKay coal, from Washington, cleaned by Method 3. Char from this cleaned coal contained 0.31% ash, thus bettering the ash content of petroleum coke. It has not been determined, however, that char from a noncoking coal can be used for anodes in alumina reduction.

The coking coals were further reduced in ash content by grinding to 325 mesh before leaching by Method 1. The coke from finely ground and leached Big Jim coal contained 0.45% ash, which was close to the ash content of petroleum coke. Thus, acid leaching may permit production of coke approaching the ash of petroleum coke, which might be acceptable in an emergency.

COAL SOLVATION

A third method of beneficiation involves solution of the coal substance. Orchin and associaties, of the Bureau of Mines, Bruceton, Pa., studied the solubility of coal in various organic compounds. Among those found as solvents for coking coals was heavy-residue creosote. This creosote was refined for use in this investigation by separating the fraction distilling between 260 C at 200 mm and 400 C at 22 mm pressure. The atmospheric boiling point of the selected portion was 340 C. Coals were dissolved in a 6-hr treatment with the boiling solvent, under nitrogen atmosphere, at a coal : solvent ratio of 1 : 5. The solution produced was very fluid at 120 C and semisolid at 0 C.

The only practical method of separating the undissolved portions of the coal and ash-forming materials proved to be centrifuging at 300 C. Specially designed centrifuge tubes were constructed to permit the centrifuged solution, after cooling, to be removed from the tube as a solid column. Since the ash-forming materials were found to be concentrated in the lower 15% of the column, they were separated by cutting this part off.

Recovery of the coal from the solution was facilitated by the fact that dissolved coal is insoluble in straight-chain saturated hydrocarbons. One volume of molten coal solution was poured into five volumes of cleaning solvent to yield a precipitated coal easily filtered on a paper membrane in a suction funnel. The residual solvents were washed out with acetone and reclaimed by distillation to yield products reusable in the process. Table II shows the ash reduction achieved with four coking coals by this process.

Margarette (W. Va.) coal can be cleaned to an ash content equaling that of petroleum coke. The recovered coal is very finely divided, but otherwise its characteristics appear to be unaltered by the solvation treatment. Both the percentage of volatile matter and the agglomerating index are unchanged.

Research so far has shown that the solvation process is the most-effective method of beneficiating coal to the purity required for electrode carbon. A small pilot plant should be constructed to produce superclean coal in sufficient quantities for application tests.

PILOT OPERATION

The pilot plant for the solvation operation, as envisaged, would incorporate a solution stage using techniques similar to those applied to digestion of wood chips in the paper industry. The undissolved solids would be removed by continuous centrifuges, such as are employed in the fish-oil industry.

The coal would be recovered from the cleaned solution and dried in vaportight tanks, filters and driers, such as those employed in the solvent extraction of oil-bearing cotton or flax seeds. The separation and recovery of the solvents for reuse has been developed for the oil-seed industry, and similar equipment could be used in coal purification. The temperatures of treatment are not high and corrosion problems, it appears, could be solved easily by the use of chromium steels, such as Type 410, in reactors in contact with the hot coal solution.

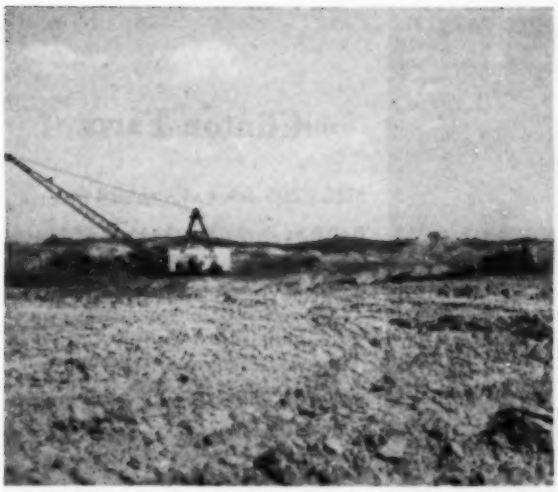
Thus it is apparent that the solvation process would employ unit operations well established in other industries. Process cost data would not be available until pilot-plant tests could be made, but an economical margin appears possible from the fact that calcined petroleum coke commanded a works price of $27.65 in 1949, while metallurgical coke was quoted at $7 per ton at the oven. The current price of calcined petroleum coke delivered at aluminum-reduction plants in the westerr part of Washington averages about $30 per ton.

↑ Farms Like This..

CREATION OF FARMS that will support farm families and add to the wealth of the community is Meadowlark's aim. The plan includes best use of banks as well as reserve coal lands that are capable of bearing crops; tests to find the best ways to rebuild worn-out soil; and experiments with crops and livestock to find what grows best, where.

From Strip ↓ Land

UPTURNED EARTH contains minerals but no organic matter and little or no nitrogen. Meadowlark speeds humus development while using land for best purposes. Soils are analyzed and classified and test plots are planted to find what will flourish. Studies also include marketability of products the soil will yield.



To Level Banks? . . . . . Or Not to Level?

IT ALL DEPENDS: At Fairview Farm (above, left), Meadowlark fully graded a test plot of 87 acres, planted it to row crops—wheat and Buffalo alfalfa—and produced a lush crop. At Clinton Farm (above, right), where soil will support legumes, only the ridgetops were knocked off—enough to permit planting by tractor. Land was planted to forage crops and purebred Hampshire hogs were turned loose to harvest the crop. Meadowlark is fully aware that 100% leveling would not be economical or even desirable. Purpose is to find out whether it's practicable and economically possible to develop an integrated, self-supporting farmstead, or a number of farmsteads, each having ungraded banks for pasture, a semi-graded field for grains and a fully-graded area for row crops, houses, barns and pens. Experts seek out the facts, then plan land use accordingly.

Meadowlark Farming

Can You Build Economic Values Into Strip Land?

The Men of Meadowlark Farms, Inc., Say "Yes."

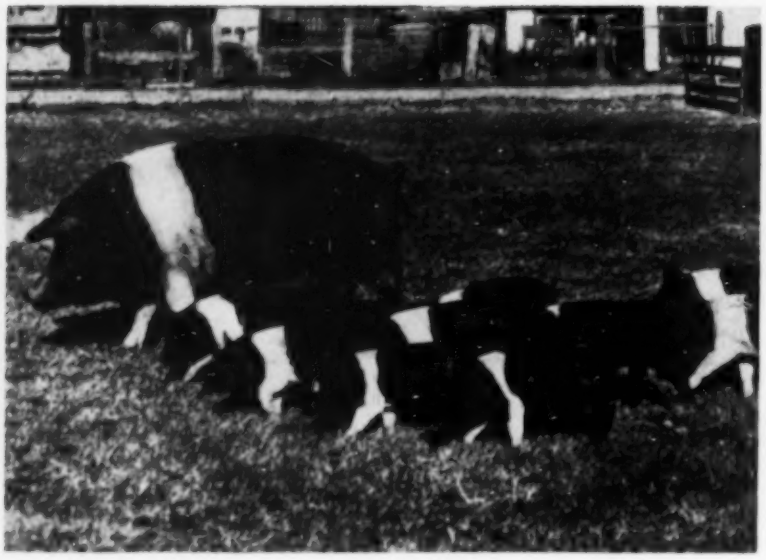
"RECLAMATION MAKES SENSE only when restored land has economic value."

That's the doctrine that created Meadowlark Farms, Inc., in 1946 and has guided its course since. Meadowlark's operations embrace 57,270 acres of stripped and reserve coal lands in Illinois, Indiana and Kentucky, owned by Ayrshire Collieries Corp. and its affiliates, Delta and Fairview Collieries Corps.

Irwin H. Reiss, who started out as an Illinois farm boy, is Meadowlark's general manager, with headquarters at Sullivan, Ind. All told, 41 farm managers and employees work under his direction on the company's acreage.

Much of Meadowlark's land is marginal or submarginal, unfit before or after mining for ordinary farming with ordinary methods. But with sound doctrine, a fine public spirit, patience, agricultural know-how and a watchful eye on costs, Meadowlark has shaped a model program to reclaim strip-mined land and rebuild worn-out farms on and near reserve coal lands. Meadowlark also makes it pay. That's the way it should be.

The pictures on these and succeeding pages, with their captions, show how well—and with what rewards—Meadowlark has put doctrine to practice.



Clinton Farm

SIZE: 300 acres of stripped land.

BANKS: Peaks knocked off.

SOIL:
Fertility—Lower than nearby land.
Minerals—Abundant potash and phosphate.
Acidity—Neutral, or nearly so.

PLANTING: Alfalfa, clover, grasses.

LIVESTOCK: 100 purebred Hampshire sows, 1,200 to 1,500 shoats annually.

WORLD RECORD of Clinton Farm's Ringgold Lady Dora (above)—nine qualifying Production Registry litters—was broken in 1952 by Brilliant Miss Royalty, another Clinton Farm Hampshire sow, with 11 PR litters. Pasturing hogs ran counter to general belief that only ruminant stock can utilize pasture and roughage effectively. Without addition of lime or fertilizer to banks, hogs grow strong and sound of bone. Clinton Farm sows—200 of them in 1950 and 1951—averaged 7.5 pigs per litter on a two-litter-per year schedule, against national average of 6.3. Boars, sows, barrows and gilts have gathered an impressive collection of prizes at fairs across the Nation. The highgrade, purebred herd is a valuable asset to the Clinton Community, townspeople as well as farmers.

Four Meadowlark Farms . . .

Fairview Farm

SIZE: 1,000 acres of stripped land.

BANKS: Peaks knocked off; 87 acres completely leveled.

SOIL:
Fertility—Low.
Minerals—Phosphate and potash.
Texture—Good.
Acidity—Neutral.
Humus and nitrogen—Lacking.

PLANTING: Alfalfa, birdsfoot and lespedeza in pasture; Buffalo alfalfa and wheat on leveled 87-acre tract.

LIVESTOCK: 225 yearling steers and heifers.

ROW CROPS, like the wheat above, have been grown successfully on the 87-acre tract that was completely leveled, though most Fairview Farm land is used for grazing feeder cattle. To provide organic matter and nitrogen for the level tract, humus was introduced through successive growth and plowing under of grasses and legumes. In the Midwest stripping areas, much of the land has little or no ability to hold water. But upturned, aerated strip banks do hold water and thus enhance the value of the land. Besides, strip-mine pits impound water which, when land is used for grazing, brings water and pasture together for benefit of cattle.

Pike County Farm

SIZE: 5,100 acres of stripped land.

BANKS: Left as is.

SOIL:
- Fertility—Low.
- Minerals—Scarce.
- Texture—Rocky.
- Acidity—Highly acid.

PLANTING: Trees.

LAND USE: Recreation.

FORESTS LIKE THIS ONE at the Pike County Farm grow on some lands that won't support legumes or grasses —that is, in soil that is acid, contains only small quantities of essential plant nutrients and is studded with large fragments of rock or heavy shale. The degree of acidity largely determines the types of trees to be planted. Cost of planting trees averages $18 per acre. Big helpers in the forestation program are the Indiana Coal Producers' Association, the Illinois Coal Strippers' Association, the Central States Forest Experiment Station, Purdue University and the University of Illinois, to mention only a few. Nearly 3,000,000 conifers and hardwoods that have been planted on Pike County banks provide cover for game. Strip-pit lakes have been stocked with fish.

How They're Run and What They Yield

Denmark Farm

SIZE: 4,300 acres of unmined land.

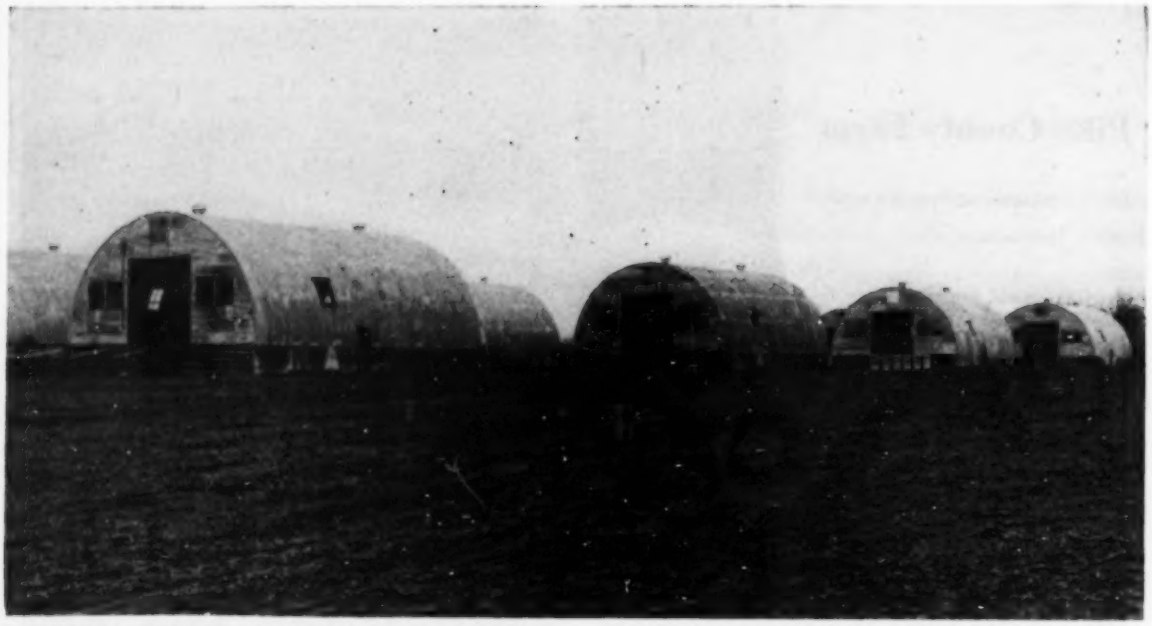
SOIL:
- Fertility—Submarginal.
- Topsoil—100% eroded.
- Subsurface—No organic matter.
- Subsoil—Illinois hardpan.

SOIL TREATMENT: Lime, phosphate and fertilizer added.

PLANTING: Grasses and roughage; soybeans, wheat and clover.

LIVESTOCK: 800 head of cattle, 1,000 ewes and lambs.

MUCH ACREAGE at Denmark Farm, held in reserve for future mining, is waste land. Meadowlark rebuilds the soil while growing the highest-type products the land will yield. As producing capacity of soil improves, livestock program expands. Livestock is rotated from one pasture to another, permitting annual renovation of 10 to 15% of total pasturage. Soil is rebuilt by planting soybeans, wheat and clover. Eventually, when mining starts, attention will be given to use of banks, while farms already created on non-coal-bearing land will become the nucleus of one or more farmsteads.



HOUSING, FENCING, SEEDING AND FEEDING—At the 4,300-acre Denmark Farm (above), it takes eight Quonset barns to care for 800 head of cattle and 1,000 ewes and lambs. Cost of buildings and facilities was $95,000. At Fairview Farm, with 1,000 acres of pasture and 225 head of cattle, $45,000 went into barns and other facilities. Boundary and division fences at Fairview cost $6,500; at Denmark, with 30 mi of fence, $26,000.

Seeding costs at Fairview ran about $18 per acre. Plane did initial seeding. Later, after bulldozer knocked tops off banks, tractor took over. At Clinton, corn, ground oats, wheat and protein supplement are fed to hogs from self-feeders. Supplement consists of 800 lb meat scrap, 200 lb linseed meal, 200 lb cottonseed meal, 400 lb soybean meal, 200 lb alfalfa meal and 200 lb minerals. Green roughage saves 40% of supplemental protein.

What It Takes to Reclaim and Farm Strip Land

FARMING KNOW-HOW AND SCIENCE—The Denmark Farm manager, Keith Thompson (left photo), like other managers and workers, is an experienced farmer. Veterinarian's supplies, individual farrowing units, water systems, power installations, tractors and portable materials-handling equipment for storing forage crops in barns—these are only a few of the hundreds of items needed to keep a first-class farm going. Everybody's job is to apply known agricultural methods to bank and reserve-land use wherever there is promise of satisfactory yield.

How Meadowlark Makes Strip-Land Farms Pay Off

PUREBRED BREEDING STOCK sold at reasonable prices to neighboring farmers lifts the quality and value of livestock in the surrounding area. Auction sales of purebred and purebred-grade commercial hogs, held four times a year in Meadowlark's auction barn near Centenary, Ind., grossed $53,089 in 1950; $82,307 in 1951.

VALUE OF STRIPPED LAND at Fairview (above) is increased by scientific agriculture. At Denmark, soil yielded only 7 to 8 bu of corn per acre before Meadowlark took over. Now Denmark Farm supports sheep, cattle and hogs, and a trial 100-acre plot yields 20 bu of wheat per acre. Where Nature takes 10,000 yr to build 1 in of topsoil, Meadowlark restored the land in 5 yr.

PUTTING DOCTRINE TO PRACTICE, Meadowlark in one year marketed 391,742 lb of beef, 359,113 lb of pork and 60,325 lb of mutton—enough to feed 5,000 people for a year. Yearling steers at Fairview Farm in 1951 made an average daily gain of 1.6 lb. At 35c per pound, gross gain was $15,742.80. Growth surpasses gains made in other Midwest grazing.

COAL LOADING is handled by high-capacity loader. Two shuttle cars operate between the loader and the belt.

New TenMile Mine Stresses

Special crews permit uniform production by handling deadwork, preparing or loading coal between shifts. All-belt haulage delivers coal to the tipple. Complete pillar extraction is planned in block mining.

ROUND THE CLOCK OPERATION with split-crew staggered starting times provide flexibility and smooth operation at the new TenMile mine of the Haywood Coal Co. Located ½ mi from Dola, Harrison County, W. Va., the new slope operation is currently producing 1,000 tpd. Excavation for the slope began in January, 1952, and underground mining began on May 4, 1952.

OPENING THE MINE

Several unusual problems faced the Haywood management when they decided to develop the TenMile mine. Surface area suitable for construction of a mine portal, railroad siding and preparation plant was limited. Preliminary investigation at the proposed mine site indicated that a large fill, bridge and railroad extension would be necessary if a standard tipple installation was to be made.

A large saving in capital expenditure was achieved by applying a *Coal Age* Operating Idea to the new plant. An overhead shuttle-belt conveyor was installed to load 40 railroad cars without moving the cars once they had been set in by the locomotive (see *Coal Age*, March, 1953).

Another problem involved driving a slope beneath the B&O railroad. The narrow space available between the creek and railroad made it necessary to drive a slope in soft ground and pass within 18-ft vertical distance of the railroad. Tracks could not be removed during the construction period so Haywood solved the problem by erecting sections of Armco No. 7 gage tunnel liners as excavation advanced. To further strengthen the support and make it waterproof, a 6-in layer of grout was pumped into voids between the metal and overlying rock. To complete the job, a concrete floor was poured in the slope.

Construction was completed in April and deep mining began on May 4, 1952.

At TenMile, the Pittsburgh seam has a uniform thickness of 8 ft, a uniform dip of 2% to the northwest and is free from clay veins. The coal lies 18 ft below the surface at the slope bottom and is well over 450 ft deep at the extremity of the property. A small quantity of methane is given off by the mine.

Overlying the coal is a very friable drawslate of varying thickness up to 3 ft. Above this is a firm shale that has sufficient strength to permit roof-bolting. A fireclay of varying thickness underlies the coal.

Prior to the development of roof-bolting, mines in the area were plagued with roof falls and roof-control problems. Roof-bolting has provided excellent control at TenMile and no serious failures have occurred since the mine was opened.

MINING SYSTEM

Two slopes on 65-ft centers were driven to tap the coal and serve as a belt haulageway, and a manway and supply heading. From the foot of the slope, two headings were developed, on the same bearing as the slope, to a point 175 ft inby the slope bottom. Here, three additional headings were started on the left and two on the right, making seven head-

MINING PLANS call for development of main entry with seven headings. Pillar extraction is planned in butt entries.

Flexibility and Smooth Operation

ings available for main-entry development.

As soon as development had reached a predetermined point, a heading was driven 150 ft off the No. 1 heading to tap the air shaft where the present fan is installed.

Breakthroughs leading left and right from the No. 4 belt heading were turned alternately left and right 45 ft apart to aid shuttle-car passing near the loading point at the end of the belt. All breakthroughs are thus 90 ft apart.

The seven headings were developed to a depth of 1,500 ft, where the entry was turned on a course N 58 deg W to tap the main body of the tract. A second Joy MTB30 belt conveyor was set up to discharge onto the first underground unit extending from the portal to the point of turn.

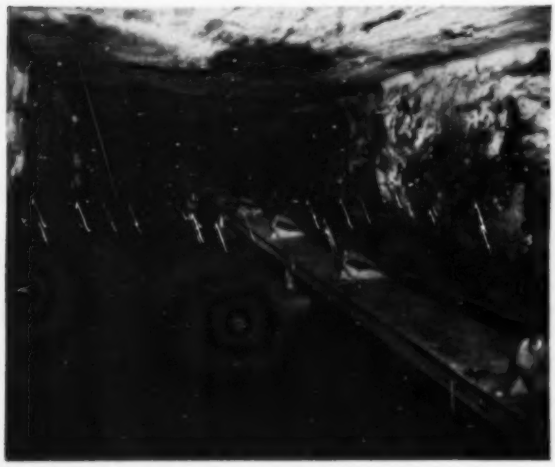
When development has reached a point 2,400 ft beyond the turn, main-entry development will be discontinued temporarily and a secondary main-belt entry will be developed to the left of the present main entry. Present plans call for the projected belt entry to be turned 2,200 ft inby the point where the main entry was turned on its present course. Four headings are to be driven on 70-ft centers with breakthroughs, on 90-ft centers, driven 90 deg with the headings. This secondary main will extend

HAND-HELD HYDRAULIC DRILL powered from the cutting machine features speed, safety and light weight.

DUAL-PURPOSE PUMP saves pump and pipe line by providing water to cutter while handling mine water.

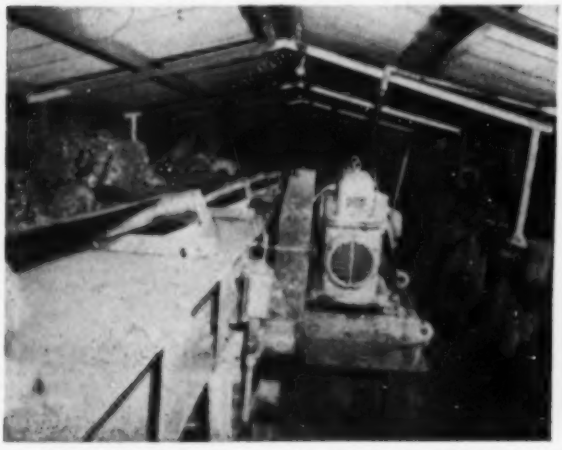
SHUTTLE CARS discharge over tailpiece of 30-in belt and center load to help belt training.

ROOF-BOLTING CREW follows the loader and installs eight 5-ft bolts. Pre-assembled bolts speed installation.

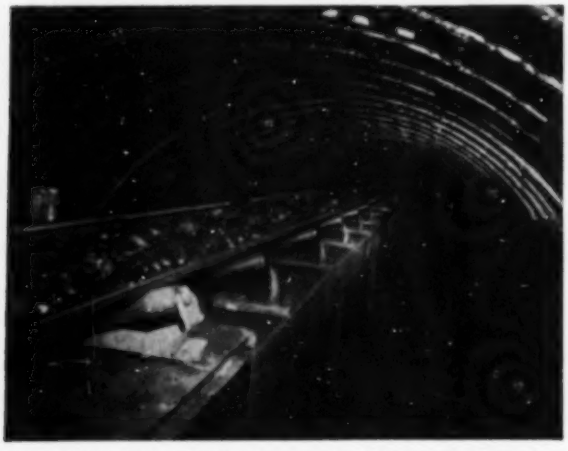


GOOD HOUSEKEEPING is evident along the main belt. Well-centered load prevents spillage.

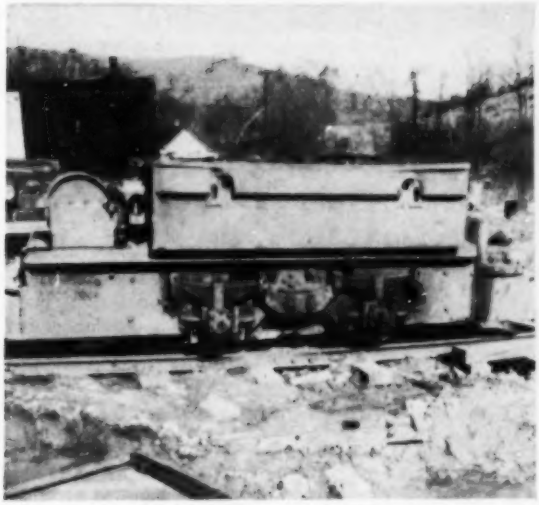
UNDERGROUND TANDEM BELTS carry coal to the mine portal. First unit is 1,500 ft long, second is 1,300 ft.



SLOPE BELT powered by 40-hp AC motor extends 1,500 ft in the main entry. All belts travel 400 fpm



CORRUGATED STEEL lines main belt slope. Grouting, 6-in thick, over the metal provides additional support



PERMISSIBLE BATTERY LOCOMOTIVE delivers supplies from the slope bottom to the working section.

CHECKING PLANS—J. G. Kidwell (left), president, Warren Wilson, foreman, and Farmer Wilson, superintendent.

SUPPLY HOIST lowers loaded steel supply cars to slope bottom.

BELT TAKEUP features wheel-mounted tailpiece moving on rails.

to the property line of the company.

The area to the left and southwest of the secondary main is projected for development with a fourth belt conveyor and offtrack equipment. Five headings will develop the area and the belt will be set up in the No. 4 heading at 90 deg with the secondary-main belt. Uniform rectangular blocks on 70x90-ft centers will be developed parallel with the main-belt entry. This system of development will produce a pattern of blocks similar to that in the secondary mains. A 279-ft barrier pillar will be left between the main entry and the first heading of the fourth belt entry.

The five headings will be driven to the property line at which point pillar extraction will be started. Pillars will be mined by the open-end method and each block will yield 28 cuts of coal. When a pillar line is established there will be 10 working places in the pillars. As the blocks to the left of the belt are in process of removal, new blocks will be developing to the right. This system of mining was selected to provide a balance between working places in solid work and those in pillars and permit uniform production. When extraction reaches a point where a new belt setup is needed, there will be no loss in production from lack of working places because territory will have been developed as the pillars were robbed. This method of mining has also been used successfully by other companies mining Pittsburgh coal.

ALL-BELT HAULAGE

After careful consideration of all factors, Haywood management decided to use all-belt haulage from the section to the preparation plant. A series of five belts, 30-in wide, traveling 400 fpm handle R-O-M coal between the shuttle-car discharge point and the tipple. Four of the drive units are set up outside the mine and are powered by 440-v AC motors. Units 1, 2 and 3 carry coal from the portal to the tipple. Unit 4, a Joy MTB30 unit powered by a 40-hp Westinghouse motor, is set up at the mine portal and extends down the slope and in the main entry, a total distance of 1,530 ft, to a point where the main entry turns northwest to tap the center of the property.

MINING THE COAL

Face preparation is given special consideration at TenMile mine as the first step in loading a clean product. The coal is top cut at 6 ft, leaving 14 to 18 in of high-ash coal as the immediate roof. Next, it is bottom cut 6 in above the floor, again leaving high-ash coal intact. A partial off-center shear is then put in the coal to permit easy breaking of the seam.

A Joy 10-RU cutting machine equipped with a 9-ft cutterbar and carbide bits cuts an average of 15 places per shift.

A new-type high-speed Schroeder Bros. hand-held hydraulic drill powered from the cutting machine hydraulic system permits the cutting machine operator and helper to do both cutting and drilling. After cutting is completed, the 2-man crew

uses the hydraulic unit to drill four 2¼-in diameter holes in the face.

In addition to eliminating a separate drill crew, the lightweight unit has the following advantages: (1) freedom from electrical shock; (2) elimination of danger of injury to operators should the auger become fouled in the drill hole, since hydraulic oil is bypassed when the drill stalls and there is no twisting of the drill in the hands of the operator; (3) easy handling because of lightweight.

Each drill hole is charged with three sticks of 1¼x8-in du Pont Monobel AA permissible powder and fired electrically with a permissible battery.

A Joy 11-BU loader moves into the freshly shot coal and loads two 10-SC shuttle cars operating between the loader and the 30-in belt conveyor. These units discharge onto the belt over the tailpiece so that the belt loading will be centered and the belt will train properly.

One of the shuttle cars has a leveling device or drag which drags the bottom while traveling between the loader and the belt. Mounted between the front and rear wheels, the lightweight steel bar acts at a road scraper and produces a smooth surface for the haulage units.

ROOF-BOLTING

A 3-man crew using a Joy WK83 self-propelled rubber-mounted compressor unit, two S91 stopers and a Chicago-Pneumatic impact wrench set better than 100 bolts per shift. Dust from the drill is collected by an MSA bolt-hole cleaner. Bolts are 5 ft long and ¾-in in diameter, with rolled threads and 1½-in square flash heads. Special bearing plates are used to speed installation. Bolts already fitted with expansion shells are purchased from Bethlehem Steel Co. and West Virginia Steel & Mfg. Co. Expansion shells are supplied by Bethlehem Steel and Ohio Brass. The special bearing plate, 6x6x⅜-in, has an oversize hole drilled off-center and slot-connected to the standard hole in the center of the plate. To complete the bolt assembly in the mine, the head of the bolt, with preassembled expansion plug, is put through the oversize hole and slid to the smaller hole. Time previously spent assembling bolts at the face is now devoted to drilling and tightening.

Bolt holes are started with 1⅝-in Timken bits on the first piece of drill steel and final drilling is done with a 1⅝-in bit.

After eight bolts have been installed and tightened, they are tested with a torque wrench to assure that they have been tightened to 150 to 200 ft-lb of torque. Thus bolts are properly installed and anchored.

SPECIAL PREPARATION CREWS

Special preparation crews working between the two full-production shifts provide flexibility and smooth operation at the TenMile mine. Each special crew has one man in each job classification so that all equipment can be moved or used for loading coal after the crew has completed their regular supplying and preparation work. The day shift production crew of 16 men works from 7:30 to 3:30, producing coal in a normal manner. The first 9-man special crew reports at 3:30 to rock dust, supply, cut coal or roof-bolt. When the special crew completes the deadwork and supplying before the end of their shift, they move to the working faces and load coal until 7:30 pm. At this time another group of 7 men report for work and the second shift normal loading begins. This 16-man crew works intact until 11:30 pm when the 9-man supply crew is replaced by a second 9-man crew who work from 11:30 to 7:30 am. At 3:30 am full-crew second-shift production stops and the second 9-man crew becomes a supply and preparation group for the remaining four hours, getting the mine ready for full production on the day shift, also loading coal after preparation work is completed.

An important job assigned to the special crews is to shovel all loose coal away from the ribs and offsets to a pile in the center of the entry where the loader picks it up as it enters the place for the first time in the shift. This results in saving coal which would be lost and sent to the rock dump if permitted to remain in the mine and be mixed with rock dust. In addition it keeps the mine floor neat.

Haywood management points out the following advantages for having the special crews working between the production shifts:

1. Ample time is available to service and repair equipment.

2. Coal loading can be carried out at any time in the 24-hr period in event of equipment failure; thus daily production is uniform.

3. Good housekeeping is easy and cheap.

4. Loose fine coal missed by the loader is recovered on the next shift.

SUPPLY SYSTEM

A 42-in supply track leads from the surface to the belt tailpiece and will be extended with each belt extension as the mine develops. Track is laid with 60-lb rail on steel ties. The track will also be used to haul equipment to the outside when major overhaul jobs are needed.

Supplies are lowered to the slope bottom by a Lidgerwood hoist equipped with a ¾-in rope. A 50-hp Westinghouse DC motor powers the unit.

At the slope bottom, a 5-ton General Electric permissible battery locomotive receiving power from Exide Ironclad batteries, takes over and delivers the supplies to the end of the belt where they are unloaded and delivered to the face or stored for future use.

DUAL-PURPOSE PUMP

Removing water from the mine workings and supplying spray water to the cutting machine is handled by one Deming 4x5 piston pump. This is made possible through a double interconnected discharge line and valve system that permits water to be directed as desired. Water is gathered from sumps cut into the rib at points where water collects and is delivered to a large 10x12x3-ft sump near the pump or it may be discharged directly to the surface if the sump is full. An adjustable bypass valve in the discharge line reduces the water pressure for the spray to any required level and passes the remainder to the sump or to the surface. The installation is illustrated by an accompanying photo.

Another advantage of this type of installation is that mine water may be conserved and delivered to the sump and stored for spray-line water when mine workings are not producing enough to supply the system. This arrangement eliminates the cost of an outside pump installation and pipe line to the working faces.

POWER DISTRIBUTION

Power is delivered to the mine at 4,160 v and converted to 250 v DC by two 150-kw General Electric m-g sets located between the two slope openings. The underground power circuit is made up of positive and negative 1,000,000-cir mil Roebling RH-covered copper cables.

Air for the mine is supplied by a Guyan Machinery 5-ft fan powered by a 10-hp Westinghouse motor. This unit delivers 50,000 cfm at a ½-in water gage.

Heading up the Haywood management group is J. G. Kidwell, president, who has his headquarters at Fairmont, W. Va. Officials at the mine are: Farmer Wilson, superintendent; Warren Wilson, mine foreman; Leslie Davis, maintenance foreman; and Arnold Phillips, electrician.

FOR LOADING, ball deflected by piled coal actuates hoist to move car 3 to 4 ft until ball swings free.

FOR CAR CHANGING, roller switch takes over, returning trip to ball control when next car is in position.

Simple Controls Load Cars Automatically

SIMPLIFICATION of the original automatic car-loading installation at Hendrix Mine, Consolidation Coal Co. (Ky.), Deane, Letcher County, Ky., has cut mine delays, added to reliability and reduced equipment maintenance.

Mine cars of 25-ton capacity are handled en-train on level track past the belt head by an electric hoist. Two balls, or "coal floats," hanging from the discharge chute, together with two rollers which the car bodies contact, operate limit switches to provide completely automatic car spotting and changing. There is no stopping of the belt or interruption in production except when something goes wrong and failure of a car to move piles coal too high on the car.

The two balls hanging over the cars are rigidly attached to the ends of roller chains which permit free deflection in one direction but when swung in the 90-deg direction cause the chain hanger to operate an electric switch. The balls hang to one side of the coal stream and thus do not suffer the beating they did when they were hung by rigid rods and closer to the center line of the car. When the lower ball is deflected by coal piled to a predetermined height, its switch starts the hoist to move the trip until the ball hangs free and then stops the trip, a total movement of 3 to 4 ft. Function of the higher ball, or float, is to stop the belt in case of a pile-up on the car resulting from failure of the trip to move.

Aprons were added to one end of each car to overlap the adjoining car, thus providing for changing cars without stopping the belt and without spillage. When a car becomes full the lower ball starts the hoist and moves the car to a position where a roller, down on the side, moves into the space between cars and takes over control of the hoist. This roller control keeps the car going until another roller, properly spaced from the first, drops between the cars, stops the hoist and turns the control back to the ball.

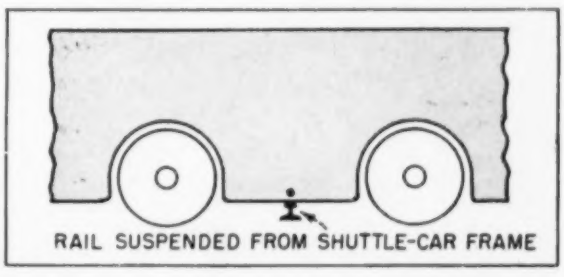
Changing cars without stopping the belt adds to efficiency in the mine, saves power and reduces wear on driving and control equipment. Since automatic belt controls are installed throughout the mine, all belt transportation stops when the main belt stops, and a shutdown of the belts, of course, interrupts the discharging of the shuttle cars.

Better Roads With Shuttle-Car Drags

A DRAG attached to a shuttle car can be of real help in keeping roadways in good condition, in the experience of H. A. Christner, master mechanic, Joanne mine, Joanne Coal Co., Rachel, W. Va. Mr. Christner observes that it would be interesting to determine where the idea first originated, but in the meantime he points out that it is simple and gets results.

The drags installed under Mr. Christner's direction consist of pieces of 30- to 40-lb rail slightly shorter than the width across the shuttle-car tires. In some mines, even heavier rail is used. In installation, the drag is hung crosswise midway between the front and rear wheels of the shuttle car, with the flange of the rail slightly higher than the bottoms of the tires. The suspension is loops of wire passed through holes in the web of the rail and in the shuttle-car frame.

A drag will not recondition an old and deeply rutted roadway but it will keep a new or rebuilt roadway in good shape, particularly if the roadway is kept properly sprinkled and otherwise is taken care of. Advantages include elimination of damage to universals and smoother, faster operation of cars.



EYE-CATCHING PLANT SHEATHED IN ALUMINUM is a wayside market for coal. You can keep customers happy if you have what they want. You can have what they want if you look alive, if you improve and if you keep a . . .

The small operator can assure his place in the sun, if he keeps on . . .

Growing by Improving Services

Vic Reidinger, operator of a small plant, says you can get along in good shape if you:

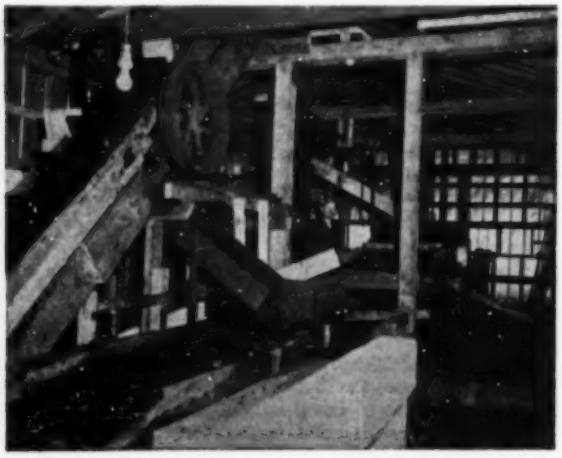
1. **Guard the quality of the product you're making**
2. **Have what the customers want when they want it**
3. **Never stop looking for improvements to make**

ALL CLEANING PLANTS are not big ones. There's a small-business side to the industry, too. One of the better examples in anthracite is the Reidinger Coal Service plant at Paxinos, Pa. Operated by Victor Reidinger, a 24-yr veteran in coal, the plant cleans and sizes deep-mined Lykensvein coal purchased from several independent operators in the Paxinos area. The major cleaning units are a Wilmot Simplex Type D jig for stove and nut sizes and a pair of 2-ft Menzies cones for the smaller sizes.

Cleanliness and good housekeeping also are features of the enterprise, since Mr. Reidinger holds the opinion that a coal man who caters to the retail truck trade should be as concerned as a grocer or clothier about the appearance of his establishment. Furthermore, such cleanliness makes environment and maintenance better.

In business for himself since 1946,

THIS 4-PHOTO STRIP (left to right) shows the raw coal being fed to bullshaker and primary rolls. . .



DISCHARGED FROM RAW-COAL ELEVATOR to primary sizing screens which prepare feed for . . .

. . . STOCKPILE OF RAW COAL WHICH YOU CAN RUN THROUGH your plant to insure supply for yourself and your customers.

when he purchased an old plant and the site on Route 122 between Shamokin and Sunbury, Mr. Reidinger points out there always is some improvement you can make. Since 1946, the plant has been substantially rebuilt and all present equipment installed. Now he looks forward to the addition of another cone to help clean pea and buckwheat and thus ease the load.

HOW THE COAL IS CLEANED

The raw coal is trucked to the plant from the nearby mines, weighed on a truck scale and dumped into the plant feed hopper. One man draws the coal out of the feed hopper as required to feed the bull shaker, which passes the minus 3-in material and scalps the plus 3-in for hand-picking. The picked overproduct of the bull shaker is broken to stove size in a double-roll crusher, and their crusher product with the underproduct of the bull shaker is elevated to the plant top.

The conveyor discharges to a triple-deck shaking screen which splits the raw coal for distribution among the cleaning vessels. The overproduct of the top deck, stove and nut, is chuted to the jig, the second deck feeds the pea-and-buckwheat cone and the bottom deck feeds the rice-and-barley cone. The underflow of the raw-coal shaker, consisting of Nos. 4 and 5 coal in the spray water, is discharged to a riffle trough where much of the high-ash fines drop out of the stream. These finest sizes are not otherwise cleaned but are sold for steam-raising.

Each of the three cleaning vessels, all fed through chutes from the raw-coal shakers, cleans a pair of sizes. The pea-and-buckheat cone is subject to surges, however, which would overtax the unit. When these surges occur, the attendant "spoon feeds" the unit by throttling the feed chute. It isn't the most desirable way to operate, so Mr. Reidinger now is installing another 2-ft cone to permit separate cleaning of the pea and buckwheat sizes. A fourth deck on the raw coal shaker soon will split the feed.

SIZING THE COAL

Clean coal from all three units is blended again in another elevating conveyor which discharges to the clean-coal shaking screens on the same plant level as the raw-coal shakers. The clean-coal shakers include three double-deck units operating from a single drive. The six decks separate the sizes from stove to barley, inclusive. Underflow consists of degradation fines in spray water, which flows to fine-coal bins.

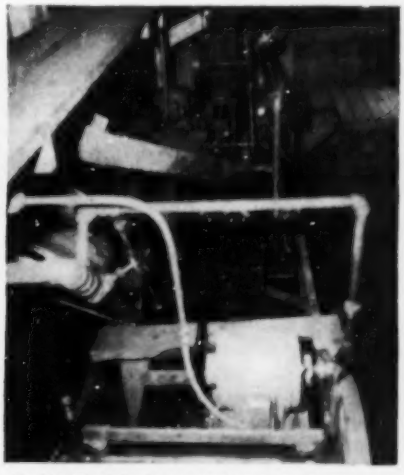
The "flats," which resist degradation in the plant circuits, tend to concentrate in the stove coal. Their removal is accomplished by jacketing the discharge section of the top deck of the clean-coal shaker with a flanged screen that permits the flats to slide backward through slots in the risers while passing the regular stove coal toward the discharge.

The flats are carried on a chute extension of the top deck to a bin over a set of rolls, which crush this material to break out the coal in smaller sizes for recleaning. The product of the rolls is fed to the raw coal elevator.

HANDLING REFUSE

A single drag conveyor transports the refuse from all three cleaners to

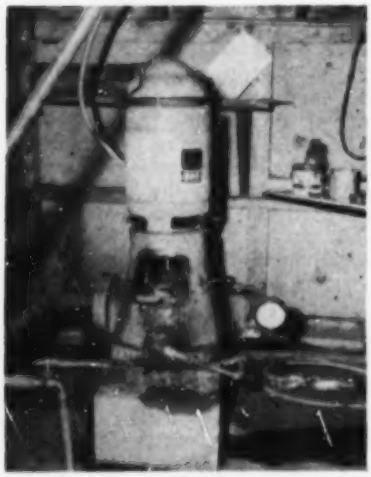
STOVE AND NUT COAL JIG, one of the plant's three cleaning units which are operated by one man, and for . . .



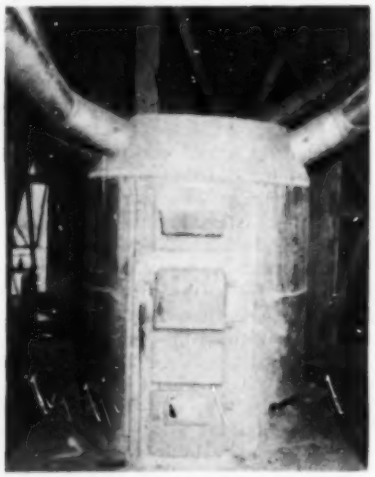
CONE-TYPE CLEANERS which recover pea, buckwheat, rice and barley.

FLATS which concentrate in stove coal are slipped out through slots in clean-coal shaker and crushed.

NOS. 4 AND 5 COAL are sluiced down a riffle trough to drop out worthless high-ash fines.



DEEPWELL PUMP at base of plant provides process water from 137-ft-deep well. Dry spells no longer mean shutdowns.



HOT-AIR HEATING SYSTEM keeps equipment limber for cold-morning starts and provides comfortable working conditions.

the elevated bin from which refuse trucks may be loaded. The slimes from the fine-coal riffle also are hauled away to disposal areas.

The overflow from the bin which holds these slimes is piped to settling dams, however, where the fines settle out. A series of dams are used for this purpose to insure sufficient settling time and to permit periodic cleaning.

As mentioned, most of the Reidinger coal is sold to truckers, who haul the coal to points as far away as Baltimore. In addition, the company has access to loading ramps on the Reading and the Pennsylvania R. Rs.

Bin capacity at the plant totals 460 tons, as follows: Stove, 100 tons; nut, 70 tons; pea, 80 tons; buckwheat, 50 tons; rice 70 tons, and barley, 90 tons. Two 16-ton bins hold Nos. 4 and 5 coal.

GETTING SMOOTH OPERATION

Since the plant and the mines which supply the raw coal are not under one management, Mr. Reidinger owns up to the responsibility of stocking some raw coal on the premises to provide for steadier plant operation and to eliminate the risk of disappointing customers. The raw coal is dumped on the ground in the storage area, and reloaded as needed by a Hough Model HF Payloader, a maneuverable loader with a ¾-yd bucket.

Water for the cleaners and sprays is provided by a 4-in Deming deepwell pump which lifts water from a 137-ft-deep borehole at a rate of 150 gpm. The 6-in borehole is drilled close beside the plant, thus eliminating long water lines. The pump is powered by a 10-hp motor, and in 4 yr of operation the plant has not lacked water.

As another contributor to steadier, smoother operation, Mr. Reidinger recently installed a hot-air heating system to eliminate the troubles that arise in starting stiff equipment on cold mornings and to provide a more comfortable working environment for the employees. The Luxaire furnace, with a 30-in firepot, has used 20 tons of nut coal throughout the past heating season in accomplishing these ends. The heat is carried in 6-in ducts to the various levels of the plant.

THE PEOPLE FOR THE PLANT

How many people? Eight, all told. There is Mr. Reidinger, himself; and his strong right arm is his son, Joseph, a veteran of the 1st Marine Division and the action at Chosin Reservoir, Korea. Joe is junior partner.

The foreman is Charles Cawthern, and he supervises three men who operate the plant; Dick Templin on bull-shaker feed and primary crushing; Jim Gripp on the sizing floor, and Charles Hart on the cleaning-unit level. Ed Persing is truck and equipment operator and Miss Martha Gripp takes care of clerical duties and operates the Toledo Truckmaster scales for weighing incoming and outgoing trucks.

And how much power do you need for a plant like this? The 50-tph plant has 18 motors which make up a connected load of 79 hp. Three 10-hp units are the largest. Controls include a master switch outside the plant and a central control board on the sizing level.

In Every Mining District
FIRTHITE *"Blue Bit"* MINING TOOLS
are stocked for quick delivery

To serve you better than ever, Firth Sterling, the manufacturer, and Austin Powder, national distributors, now put FIRTHITE "Blue Bits" *where* you need them, *when* you need them. There is an Austin Powder Company stock of FIRTHITE "Blue Bit" Mining Tools for immediate delivery in your area.

You can count on this rugged, dependable, proved-in-the-mine line of machine bits, auger and roof drill bits and finger (strip) bits in styles and sizes to meet every mechanized mining need.

R-289

THE STRONGEST BRAZE IN ANY CARBIDE TOOL!

Designed with sintered carbide cutting edges on both sides as well as the point, to eliminate tool wear, binding and power drag.

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Foremen's Forum

IN TIMBERING OR BOLTING, good roof support requires a systematic pattern of installation and frequent sounding tests interpreted with good judgment. Both are weapons in the battle with the No. 1 hazard—roof falls.

The Technique for Sounding Roof

Here's a run-down of the factors involved in sounding roof properly and some practical tips on those times when sounding might mislead you. You must use your eyes as well as your sounding bar and fingertips.

By W. J. EGAN, Resident Engineer, Hanna Mine
Union Pacific Coal Co., Hanna, Wyo.

THE MILLIONS OF YEARS between the time first mentioned in the accompanying verses, when the sunshine and chlorophyl were transforming the hydrogen, oxygen and carbon of the air and soil into cellulose and lignin, which later became the complex chemical coal, and the present era of its use has been a far cry, and it has been only during the last several thousand years of this time that mankind has known anything about coal, only a few thousand years during which it has been of any commercial importance and only a few hundred years since it has become indispensable in our economy.

England first began mining coal late in the 13th century, other European countries beginning about 50 yr later and using the mining knowledge gained by the English. But the industry did not reach any significant size until the beginning of the 19th century. And also at this time coal mining became important in the United States.

Reprinted with permission from The Union Pacific Coal Co. *Safety Review*, May, 1953.

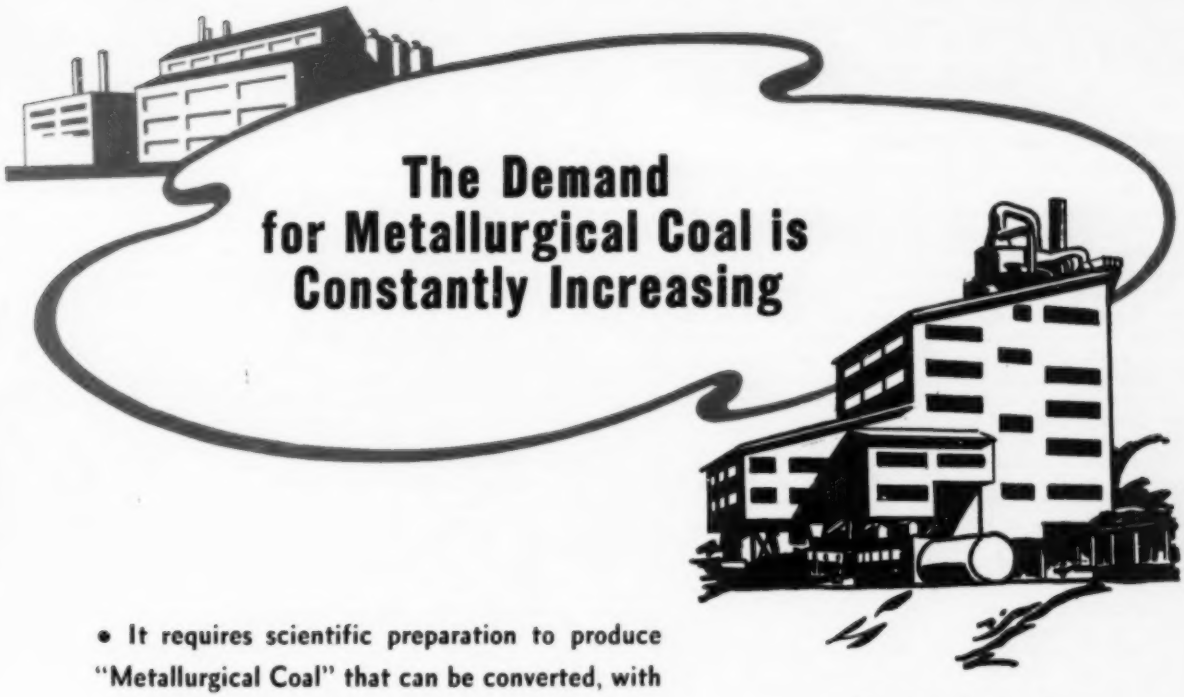
The practices of these early workers were deplorable, dangerous and ridiculous in view of our present laws, safety measures and mining know-how. Mothers, young women and children carried coal from the pits in baskets. Ventilation, other than natural, was not done until 1732, and then with furnaces. Fans were not common until 1850. Firedamp was burned out by a fireman who was wrapped in wool or leather and who crawled along the floor extending his light toward the face.

Illumination in the mines was with open lights, and in the gassy fields reflecting mirrors were tried to bring light from the surface down into the pits. Sir Humphrey Davey's inven-

---

Afar in the Carboniferous time
I grew in Paleozoical slime,
A lepidodendron with boughs on my stem
And lepidostrobuses grew out of them.
My roots in the mud of the ages I spread
And up to the heavens I vaunted my head,
I throve in the heat of the tropical sun,
And now I am coal at six dollars a ton.

Behold from my bed on the primitive shale
How quickly they raise me; the steed of the rail
Is mine, yes, mine are the ships of the sea
And shivering multitudes clamor for me
As chariot borne through the sleet and the snow
Of winterbound cities in triumph I go,
In honor and dignity second to none,
For now I am coal at six dollars a ton.



The Demand for Metallurgical Coal is Constantly Increasing

• It requires scientific preparation to produce "Metallurgical Coal" that can be converted, with minimum loss, into the highest quality coke. In 1951, 121,749,000 tons of coal were consumed in the production of coke, gas and steel.

FAIRMONT designs, fabricates and erects preparation plants that enable you to produce coal of uniformly high chemical and physical properties and permits you to compete favorably for your share of this growing market.

FAIRMONT plants located throughout the industry are meeting rigid premium coal specifications with cleaning plants designed to meet specific requirements.

FAIRMONT guaranteed cleaning plants are designed in sizes ranging from 40 tons per hour up to any desired capacity.

Consult FAIRMONT ENGINEERS on your coal preparation problems.

You can meet rigid specifications with a FAIRMONT Preparation Plant

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

Designers and Constructors of Complete Coal Preparation Plants Using Both Wet and Dry Cleaning, Centrifugal and Thermal Drying.

tion of the safety lamp in 1815 was not used to any extent except for testing purposes, until after 1841.

During all this time man has been slow to absorb and fully comprehend the technique of safe mining. The fact that he survived at all was due not to his limited safety knowledge but to his fortunate lack of exposure at critical moments.

DEVELOPING SAFE PROCEDURES

The development of safe procedures has been in many cases slower than the mining and in some instances little better than when the caveman sounded the roof and walls of his home with a bone and his fingers to see if it was safe enough to sleep under.

And in spite of our increased knowledge in safety practice, the No. 1 hazard is the accidents caused by falls of roof and sides. The technique employed by the caveman still is one of our best methods when used properly. But it is mastered by only a small percentage of the workers and supervisors in underground workings. As proof, more than half of all fatalities and injuries in anthracite and bituminous mines have been caused by falls of roof and sides for the past 50 yr or any given year, the Bureau of Mines reports.

The looseness or tightness of the coal and rock are apparently very simple facts to ascertain. It is assumed that anyone can well distinguish between a solid safe roof and a loose hazardous roof simply by striking it with a tool or rod and noting the solid or loose sound. Such roof and side examinations are wholly confined in but two sounds, solid or loose.

Unfortunately this is not the case. Mother Nature in making the coal beds put many obstacles in the overlying strata as well as in the coal seam. Mud bands or partings in the coal allow falls to break at these partings. Inclusions of sandstone deaden or give different or misleading sounds. The pressure and weight of the overlying strata squeezing the coal bed to the final thickness caused slips and minor faults to be in the coal and frequently to continue into the roof.

In covering the coal with sediment Mother Nature was not very particular. She used varying thicknesses of sandstone, shale, limestone and mixtures of all three; she added tree stumps, sulfur balls, kettle bottoms, rider seams, and then allowed water to seep through the slips and faults to wash out any cementing substances so that they would be ready to fall and catch the unwary.

But by mastering the technique of sounding we can learn to avoid these hazards by removing them or applying our knowledge of correct timbering. The beginner in this practice will be surprised how frequently the sound will not be as anticipated. And among the questions will be those on the cause of sound, causes of the differences in roof sounds and the reasons for so many errors in sounding and concluding that the rock or coal is solid.

HOW SOUND IS MADE

Sound is the resultant waves of a quivering or contracting object and behaves similar to the waves caused when a rock is thrown into a pool of water; and sound must have a medium in which to travel. The speed at which sound waves travel through air is 1,088 fps; through water, 4,728 fps, and through shale, 11,417 fps. Sound is damped, or deadened, by the medium through which it travels. Stones of the same size dropped into a pool of water and a vat of molasses will not produce the same wave action, the waves in molasses being dampened more than those in the water. The same is true when a shale roof is sounded and then the coal ribs. The coal deadens the sound more than the shale.

The solid, thud and drummy sounds are the chief three sounds heard in testing. When a tap or blow is made on a large mass of shale, the surface vibrates at the zone of the tapping and sets up vibrations in the shale. The surface vibrations of the shale create sound waves in the air which in turn reach our ear. When the body is solid we get a definite musical ring, a solid sound.

If there is a crack in the roof, we have two rocks. The natural pitch of the sound will be altered by the crack. The vibration of the part sounded is dampened by the other part of the rock, similar to damping a vibrating string with the finger, and the result is a thud. The thud is a cushioned sound because of the high degree of damping. It is a short sound, the time of vibration being limited and the ring from vibration being absent or materially reduced under this condition.

BAD ROOF SOUNDS DRUMMY

The drum sound in mine roof is similar to the musical drum in cause and effect. The drumstick vibrates the drum parchment it strikes. The vibration is deflected back and forth between the two drumheads, but the reflected waves are not in phase.

When a surface in the mine is struck and vibrations are set up, the energy is transmitted to an air or gas cavity and on to a back surface. The back surface, the front surface and the air vibrate at the same frequency but out of phase. This is a drum sound again. If conditions are not right—backing rock too far away, too rough or too angled for the drum condition—the resultant sound might vary anywhere between a solid ring or a thud.

It has been stated that we obtain 70% of our knowledge through sight, 25% through hearing and the remainder through the other senses, touch, taste and smell. By using sight and touch along with our hearing, we can get a more accurate knowledge of roof or rib conditions.

VISUAL INSPECTION HELPS

With our eyes we can notice excessive roof weights by the crushing of pillars and timbers. As the weight increases we can see the particles which come from the face or pillars. The presence of vertical breaks can be found only by eye. The freshly chipped surface edge from weight of a large rock is evidence of a bad hazard that cannot, because of the rock's bigness, be found by sounding. The appearance of a moisture line often indicates that a break will soon appear.

Slips occasionally are flatter than 30 deg, but usually are found to be between that angle and the vertical. At 40 deg or more there is no drummy or thud sound until soundings are made within a few inches of the visible location of the slip.

The sense of touch is used to the greatest advantage when the vibrations are dampened so that they are too faint to distinguish, but are readily felt by the fingertips which are placed on the area while sounding with the other hand.

We know there are many variations in the vibrations obtained from sound and that soundings are not effective on a large or thick rock. There is real need for some simple, pocket-size gimmick that will produce the solid tone of any given roof for quick comparison and for a tool that will do a better job of sounding.

In the meantime, it behooves us to develop our senses to enable us to make our work safer.

★ ★ ★ ★ ★

Ladder of Success . . .

100%—I did
90%—I will
80%—I can
70%—I think I can
60%—I might try
50%—I suppose I should
40%—What is it?
30%—I wish I could
20%—I don't know
10%—I can't
0%—I won't

—Baltimore & Ohio Magazine

★ ★ ★ ★ ★

Conditions:

EXTREME

Performance:

"IMPRESSIVE"

It's asking a lot of any engine to run in heavy coal dust, at 5,000 feet altitude, through extreme temperature variations, 16 to 24 hours a day, 24 days every month. Yet this Caterpillar D397 is still going strong after nearly two years under these conditions at the briquette plant of Luscar Coals, Ltd., Luscar, Alberta. No wonder W. Widdifield, the foreman, says, "The ability of our D397 to operate continually, without any breakdowns, is impressive."

This Cat* Electric Set furnishes power for two briquette machines, having a total output of 400 tons per eight-hour shift. The finished product has many domestic and commercial uses.

Long-wearing aluminum-alloy bearings and specially hardened cylinder liners contribute greatly to the work life of the Caterpillar D397. Efficient filters and dust seals protect its built-in precision, even on a dusty job like this one.

For reliable, low-cost power, many owners standardize on Caterpillar Diesel Engines. They find an added payoff in increased operator familiarity and one-stop service from Caterpillar Dealers.

Your dealer provides fast, skilled service on your Caterpillar Equipment. He will be glad to tell you about the 12 honestly rated Caterpillar Diesel Engines and Electric Sets—up to 500 HP and 315 KW. He's as close as your telephone—call him today!

Caterpillar Tractor Co., Peoria, Illinois.

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WE'VE MADE CLAIMS...
NOW MAKE US
PROVE THEM

Operating Ideas

Winder Spools Belt Uniformly With Minimum Effort

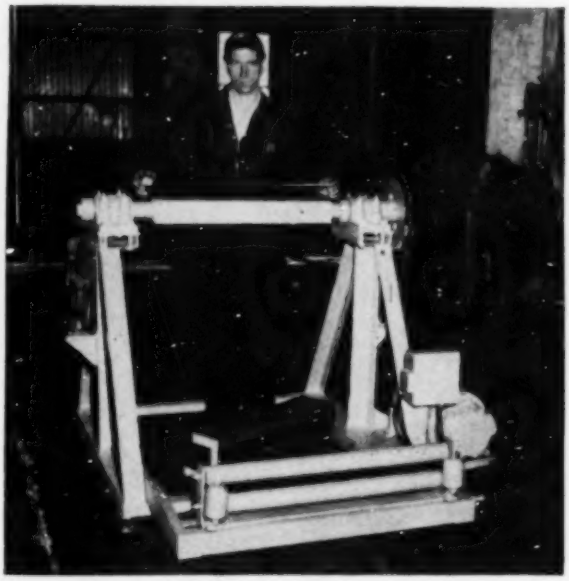
PHYSICAL EFFORT of two men is saved and the job done in considerably less time by a belt-winding device designed by H. B. Shockey, chief electrician, Bolair mine, Pardee & Curtin Lumber Co., Bolair, Webster County, W. Va. Placed for stationary use in the mine yard near the supply-track portal, the machine is primarily intended for winding belts brought out of the mine in 40-ft layers or loops on flat-top supply cars.

A belt-haulage mine opened in 1943 (*Coal Age*, August, 1945) and one of the first new mines using belt haulage in high coal, Bolair has until recently been advancing, so that new belts were going into the mine and only occasionally was a belt brought out. Now the picture has changed and belts are beginning to come out of the mine. The machine was built to speed and ease belt removal.

The machine's axle, built with a square center portion, is driven at 24 rpm (maximum) by a motor and reducer from a scrapped 32-E shuttle car, with final reduction by roller chain up to the axle sprocket. An important feature is a spooling device with top, bottom and vertical side rollers, all mounted on a sliding base with screw adjustment and handwheel, to force the belt to spool properly. Without this spooling feature, it would take the heavy and skilled effort of two men to obtain fairly uniform spooling with reasonable speed.

All belts used in the mine are 30 in wide and the maximum lengths of 1,000 ft weigh approximately 2,000 lb. When wound on a 7 x 7-in core, the belt roll is 80 in in diameter.

To get the 1-ton roll out of the machine, lifting jacks are placed on brackets provided on each side of the unit, the bearing caps are removed and the axle raised 4 in. Planks are then slid under the roll and the jacks lowered so that the weight is on the planks. The roller chain then is removed, the shaft pulled out of the core and the belt rolled out on the planks to a storage location.



H. B. SHOCKEY, chief electrician, and developer of the belt-winding unit, indicates the square section of the axle 30 in long. At his feet is a 7X7-in wooden core on which belting is wound, and a jack placed temporarily on the pedestal at the left shows how the axle loaded with a belt is raised.

Post Mounting Speeds Telephone Installation

SPECIAL POST MOUNTING of mine phones speeds installation and removal at the TenMile mine of the Haywood Coal Co., Dola, W. Va. The easily installed unit is mounted on a piece of ¼-in sheet metal welded to a piece of 2-in pipe. A top section from a screw-type roof jack fits into the pipe and permits easy and quick adjustment to coal height when the phone is being installed.

To move the unit to a new location, wires are disconnected from the main rubber-covered telephone cable, the screw top on the post is loosened and the package unit is carried to the new location and put in place similarly to a safety jack used at the coal face. Telephone cable is extended and the phone is connected at the new location. Since the development of this type of mounting, the time spent in making a cable splice when extending telephone cable is the toughest part of the installation, Haywood management reports.

LET US KNOW about your good "Operating Idea." COAL AGE will gladly pay you $10 or more for each usable idea, on publication. Write: The Editor, COAL AGE, 330 W. 42d St., New York 36.

300% More Bolt Holes per Bit!

Simple roof drilling rig consists of cap or pan (for holding drill) mounted at end of double-strength steel bar which is used as lever in notches of steel fulcrum. As bit penetrates roof, lever is raised to next notch.

By applying Kennametal Sintered Carbide Rotary Bits in this operation, the mine is able to drill and bolt with the same equipment. Drill is also fitted with Kennametal Bits and used at the face for blast holes.

Leechburg Mining Company's Park-Armstrong Mine uses Kennametal Sintered Carbide Bits to get substantially lower costs for roof drilling in its 32-inch seam. Hard, tough Kennametal Bits average *fourteen* 2-foot holes per sharpening—*over three times* as many as other carbide bits could drill!

Until Kennametal was used, it was impractical to rotary drill this roof. Now, a simple rig has been devised so that drillers can readily install longer drill rods to keep pace with drilling speeds.

Kennametal Sintered Carbide Bits can reduce costs in ordinary conditions and solve drilling and cutting problems where conditions are severe because (1) Kennametal has shock- and wear-resistance superior to any other tungsten carbide and (2) Kennametal Representatives—veteran mining men with years of actual mining experience—go into the mine to demonstrate the right bit for the job.

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book — or, write direct.

WORLD'S LARGEST MANUFACTURER OF TUNGSTEN-CARBIDE

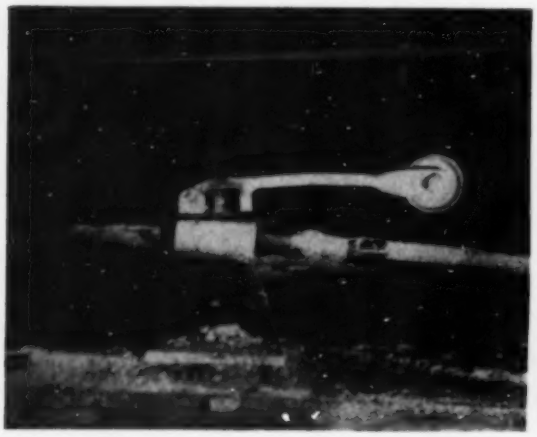
DRILL BITS, CUTTER BITS, ROOF BITS, STRIP BITS

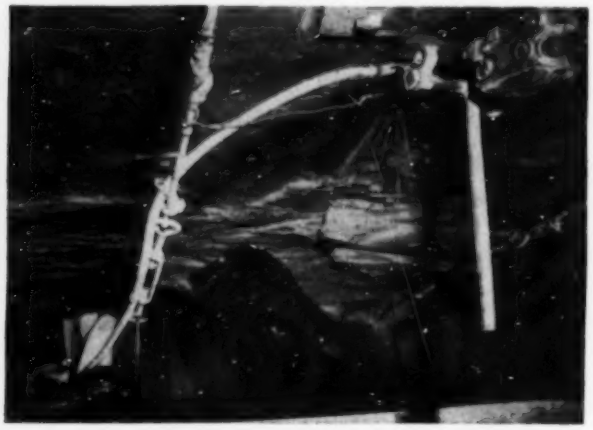
KENNAMETAL®

KENNAMETAL INC., MINING TOOL DIVISION
BEDFORD, PA.
GENERAL OFFICES and MAIN PLANT at LATROBE, PA.

Everybody Gets Ideas

An alert operating management receptive to suggestions from all sides sets the stage for developing new or better ways of handling many everyday jobs. A *Coal Age* editor recently had a practical demonstration of how well this attitude can work out when he visited the Hendrix mine of Consolidation Coal Co. (Ky.), Deane, Letcher County, Ky. It seemed like everybody gets into the act at Hendrix, and the six "Operating Ideas" on these pages are only a part of those our editor "found" on his tour of the mine. A simple way to control car loading and changing automatically appears on p 99 and others will be published in later issues. Incidentally, if like Hendrix's management, you're proud of the ideas your staff generates, why not tell *Coal Age* about them so that we can arrange for a mine visit and write them up for our magazine.





Belt Controls Spray by Simplified Direct-Action Lever

REDUCTIONS in first cost, maintenance and outages affecting safety were accomplished by a simplification of the controls of water sprays at belt transfer points suggested by Columbus Phillips, belt-maintenance man in Hendrix mine. Eliminating solenoids and other electrical gadgets from the spray control, the new method involves a cost of only $10 to $12 for parts, as compared with approximately $80 for the previous system.

Water is supplied to the spray nozzle via a Crane ½-in quick-acting valve installed under the center of the belt 10 ft from the conveyor discharge and equipped with a lever that has a roller on the end to contact the belt (left). Load on the belt depresses the roller and by direct action opens the valve against its built-in spring. The spring also acts to raise the lever and roller when there is no coal on that section of the belt. Spray is shown in operation (right) as coal is discharged from section belt to main belt. Limit switch and rod on roof are a protection against coal pileup and have no connection with the spray.

Principal troublemaker of the former system was the solenoid and the company had been unable to find one so designed as to give troublefree service over long periods. "Spray not working," a familiar complaint of the company's safety inspector, has since been practically eliminated from mine reports.

Wheels and Tongue Make a Mobile Grease Gun

CARRYING tools by hand in a 42-in working height is not in keeping with a modern, mechanized mine. Where the bottom is firm and reasonably dry, as in the Hendrix mine, wheels can answer the need and save a great deal of time and effort.

Mayo Holbrook, shop mechanic at Hendrix, put a pair of wheels on the grease gun so that the section greaser may easily pull it from place to place (left photo). When the unit is placed upright for operation (right), its wheels clear the mine bottom. The tongue with hand loop at the end is rigidly attached at a convenient angle. Now, all sections of the mine have been equipped with these wheel-mounted grease guns.

At Consol's Hendrix Mine

Two-Way Strain Chains Save Loader Cable

DELAYS from trailing-cable failures at the entrance bushing have been practically eliminated and the electrical hazard greatly minimized by strain chains added to the 14-BU loading machines in use at Hendrix mine. Feeder strain clamps are placed on the cable 12 in from the bushing and two chains attached to anchor the clamps to the machine frame. As a result, the cable terminal is relieved of strain regardless of the direction the loader is traveling. Denver Plummer, maintenance foreman, suggested and devised this improvement.

Foremen Carry Simple Tools For Emergencies

EMERGENCIES affecting safety and complications involving production may arise in the best of mines. Simple tools immediately available to a man who knows what to do with them may spell the difference between a disaster and an incident. Similarly, a simple tool at the right time may save an impending breakdown or minimize a threatened delay. Section foremen in mines of the Consolidation Coal Co. (Ky.) carry pliers, screw driver and adjustable wrench—not to work with themselves, but for emergencies and to lend to their men where "a stitch in time" is needed.

In this photograph taken in Hendrix mine, W. E. Davis, section foreman, shows his standard equipment, consisting of a flame safety lamp, combination roof tool and cane and a leather pocket containing screw driver, pliers and adjustable wrench. In his pockets, he also carries a simple weight with strings for sighting places, a 50-ft tape, chalk and a folded booklet of the mining plan for his section.

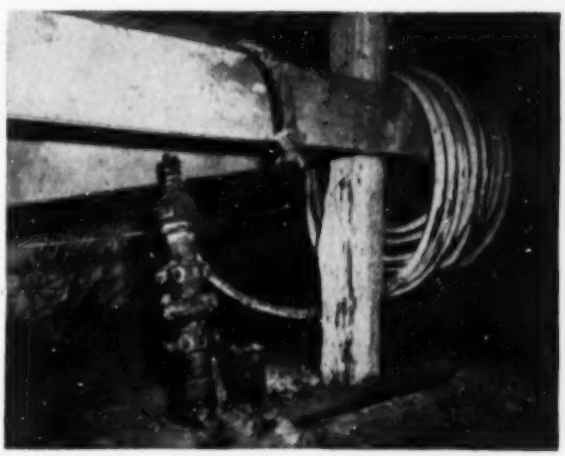
Beltline Fire Plugs Accommodate Three Connections

FIRE PLUGS along beltlines in Hendrix mine can accommodate any one of three portable connections: ¾-in hose fitted with King quick-acting connectors; 1-in pipe; and firehose fitted with 2½-in pipe-thread connections. The idea, fathered by R. C. Collier, general mine foreman, has improved fire protection throughout the mine.

Beltlines are paralleled by 2-in pipe lines with an 80- to 90-psi supply of deepwell water from three 1,000,000-gal tanks outside the mine. The water is piped to belt transfer points and to working places for allaying dust. It is so pure that the men drink it and commonly carry lunch boxes with thermos bottles instead of regular water-holding dinner buckets.

A fire plug is installed outby each belt drive and every 500 ft along the conveyor, with the locations prominently indicated on a wall map kept posted in the mine office. The upper part of the fire plug is assembled in the shop from a 2-in plug valve with attached lever and fitted with Victaulic couplings, a 2-in nipple, 2½ x 2-in bushing, 2 x 1-in reducer, 1 x ¾-in bushing and the hose connector.

At the belt drives, 100 ft of ¾-in hose normally is kept connected to the fire plug ready for instant use. (The hose shown in the accompanying photo was disconnected only for photographing.) Plugs out along the beltline that are not equipped with hose have their openings protected against foreign matter by tomato cans painted red and placed on top.



MORE

SHOTFIRER (left) carrying his wooden tamping bar pulls a toy wagon loaded with stemming material, explosive, detonators in proper containers, shooting cable, multiple-shot blasting battery, roof-sounding bar and flame safety lamp

With his wagon, section repairman (right) can easily take along his full set of tools, plus a few small spare parts.

Boy's Wagons Do a Man-Sized Job

CHILDREN'S WAGONS are standard equipment for shotfirers, section repairmen and men on specialized jobs at Consol's Hendrix mine. They save a lot of time and make the work less arduous.

Dallas Carter, shotfirer, pointed the way several years ago by buying one of the wagons himself, taking it into the mine and using it regularly to carry his equipment and supplies. About 2 yr ago Emery Caudill, maintenance mechanic, also bought a wagon and began using it to tote his tools and small parts.

By that time mine officials realized that the wagons were really desirable, so the company reimbursed the men who had put their own money into them and immediately purchased wagons for the whole mine. As many as four are used on some sections.

Seam thickness is 42 in. In that height a man's travel is hampered very little by pulling a wagon, but is greatly hindered by carrying 25- to 50-lb loads of tools and supplies. The mine bottom is hard and dry, a condition favorable to the small wheels and tires of the toy wagons. Specially designed wagons to stand the gaff better than the toy wagons have been considered but it is less costly to buy more of the standard article.

Section repairmen carry approximately $200 worth of tools in the wagon and, in addition, a few spare parts. When they had to carry the tools and parts by hand, it was not uncommon for a man to arrive at a machine without the proper tools. That meant a sub-standard repair job or a delay for making a second and, perhaps, a third trip to base.

How to Prevent Sticking Contacts and Relays

HOW OFTEN have "sticking" contactors been a source of electrical trouble for you? It is a common occurrence in small devices where springs are small and their pressures on contacts are relatively weak. A little time and effort on your part will eliminate most of the sticking problem. Following are causes and cures for sticking contacts and relays outlined by R. S. Kercher, Cline Electric Mfg. Co., and L. E. Markle, Westinghouse Electric Corp., in Westinghouse's *Maintenance News*, together with additional suggestions from readers of that publication carried in a subsequent issue.

Contactors and relays operated by DC coils will always have some residual magnetism in their magnetic circuits after they have been de-energized. This may be strong enough to hold the device closed after the operating coil has been de-energized. This problem is more common in DC than in AC devices.

Magnetic sticking can be eliminated by adding a thin shim of non-magnetic material in the magnetic circuit. Convenient places to add the shim are on the face of the stationary core of the coil or on the corresponding face of the movable armature. While effective on DC-operated devices, this method is not so satisfactory on AC-operated ones because the addition of a shim in the air gap area causes AC devices to operate noisily and with a pronounced humming noise.

TYPICAL RELAY (exploded view) showing air-gap surfaces that can cause sticking.

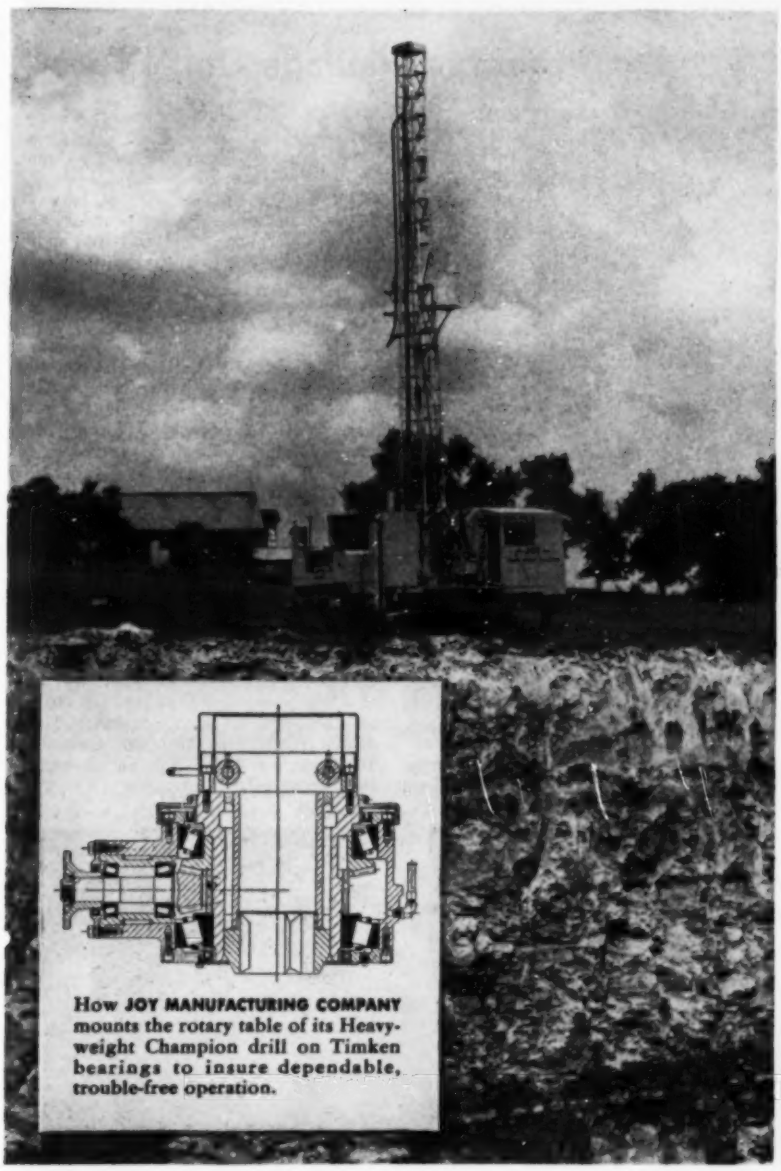
The air-gap surfaces on the stationary cores and movable armatures of an AC-operated device are closely fitted to obtain quiet operation and are often filed to obtain close fits. To prevent rusting during shipment, with consequent noisy operation when put in service, the filed areas are covered with a light coating of lubricant. Excess lubricant may cause a seal that will hold small devices in the closed position after the operating coil is de-energized. Wiping excess lubricant from the surface before placing in service will eliminate this cause.

Residual magnetism in AC-operated contacts can be eliminated by drilling a hole in the stationary core and tapping for a 10-32 brass screw. After the screw has been inserted it is cut off and filed almost flush with the face of the core. If the contactor chatters when the coil is energized, the screw is filed off until the chattering stops. The chattering can also be eliminated by closing and opening the contactor several times electrically. The hammer effect is usually sufficient to take the screw down the required amount.

Another method of handling the problem is to drill a ⅛-in diameter hole into the magnet core and drive in a piece of copper wire. The wire is then filed off until the contactor stops chattering but does not stick.

Certain vapors and unusual atmospheric conditions will deposit sticky films on air-gap surfaces, causing sticking in the closed position. Dust and dirt may cause devices to remain closed. Such conditions must be corrected by removing the dirt and dust with compressed air or vacuum cleaners or by wiping the surface clean with suitable solvents.

Joy's new rotary "air-blast" drill depends on TIMKEN® bearings



How **JOY MANUFACTURING COMPANY** mounts the rotary table of its Heavyweight Champion drill on Timken bearings to insure dependable, trouble-free operation.

THE Joy Manufacturing Company's new Heavyweight Champion 58 BH blast hole drill meets every demand for speed and endurance in quarrying, mining, and other drilling operations. One reason why: the drill's vital moving parts, including the rotary table, worm drive assembly, and thrust yoke, are mounted on Timken® tapered roller bearings. Dependable, trouble-free performance is assured.

Because of line contact between rollers and races, Timken bearings have extra load-carrying capacity. Their tapered construction enables them to take both the radial and thrust loads imposed on the drill's rotary table, worm drive, and thrust yoke.

The incredibly smooth surface finish and true rolling motion of Timken bearings practically eliminate friction. They permit the Joy drill to operate freely, even under the most demanding conditions. And because Timken bearings make closures more effective, lubricant is kept in—dirt and moisture kept out. Drill maintenance and lubrication costs are reduced to a minimum.

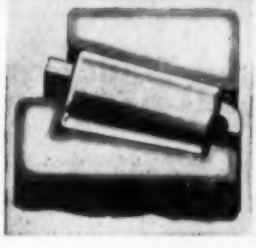
No other bearing gives you all the advantages of Timken bearings. Make sure they're in the mining equipment you build or buy. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



HARD ON THE OUTSIDE, TOUGH ON THE INSIDE

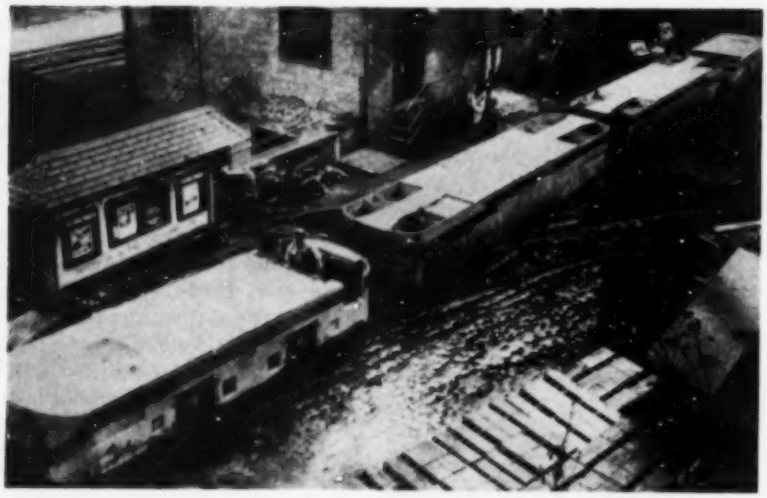
Rollers and races of Timken bearings are case-carburized to give a hard, wear-resisting surface and a tough, shock-resisting core. Result: longer bearing life.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▭ LOADS OR ANY COMBINATION

Equipment News

World's Largest Battery-Operated Haulage Unit (1)



Specially designed to reduce mainline haulage costs by increasing coal hauled per trip and decreasing number of trips per shift, the world's largest underground battery-operated haulage unit was recently installed in the Olga No. 1 mine of the Olga Coal Co., Coalwood, W. Va., to haul coal from the working faces some 4 to 6 mi to the shaft bottom in 50-car trips. Consisting of two 20-ton Jeffrey haulage locomotives and two power cars housing 37 tons of Gould-National batteries with 625-kw-hr capacity, the unit is 100 ft long and stands less than 4 ft off the rails. In developing the unusual new unit, the combined experience and facilities of the engineering and research groups of Olga Coal, Jeffrey Mfg. Co. and Gould-National Batteries, Inc., were made available.

Preliminary tests of the original unit have proved mainline haulage design and the complete feasibility of battery-powered mainline haulage under the conditions at Olga Coal and four more complete units now are under construction, it is reported. Both driving sections of the locomotives are operated by remote control as a single unit and the locomotive operator can handle the entire unit from either end. Each driving section is equipped with two independent braking systems, air and dynamic.

A special new type of battery designed for this application, designated as Gould Type KOD-33, consists of 120 cells, 240 v, with a rated capacity of 2,688 amp-hr at the 6-hr discharge rate. It supplies current up to the maximum rate of 1,600 amp and will operate the unit for a full 8-hr shift. The batteries are charged by constant potential rectifiers starting at a rate of 650 amp and finishing at 130 amp, and duplicate batteries are used to permit recharging of one at the end of a shift and connecting of a fully charged battery into the circuit for the start of the next shift. More details from Jeffrey Mfg. Co., Columbus 16, Ohio, or Gould-National Batteries, Inc., Trenton 7, N. J.

Side Dump Trailers in 10- and 30-Yd Capacities (2)

Recently announced by Easton Car & Construction Co., Easton, Pa., a new lift door side-dump truck body (left photo) has a capacity of 30 tons (iron ore) and is the largest of its type. Designated as Easton Model BL-1530, the body features special floor-reinforcing plates of 4 x 1-in abrasive-resistant steel, and dumping is accomplished with an external overhead hoist. The body is mounted on a Dart Model 300 diesel-powered 6-wheel chassis. The new Model TP-810 (right) is the smallest of Easton's line of side-dump pan-type trailers for shuttle service in mines and quarries and has a capacity of 8 cu yd or 10 tons. The body is all-welded ⅜-in plate with sturdy box-section reinforcements and an oak floor cushion and to avoid excess wear on one side the body may be reversed from end to end, the maker points out. Easton's electric overhead hoist is used for dumping and the trailer is equipped with Easton Model No. 20 rubber-mounted quarry-type 5th wheel and a standard-type axle with springs.

Kennametal Bits
Cut 10 times more places per bit life

at Vinton Coal and Coke Co.

POWER SAVED
Use of Kennametal Cutter Bits has reduced power consumption by as much as 30% to 50% in typical Penns. and W.Va. mines. The comparisons were made using either tong-testers or watt-hour meters.

BITS STAY SHARP LONGER
The Kennametal Bit illustrated is typical of a set that cut 100 places (Winifred Seam, W.Va.) before being sharpened. Bits were still capable of cutting several hundred more places.

The severe cutting conditions at Vinton Coal and Coke Co. had often made bit changing necessary after each place cut. Bits had to be discarded after cutting a maximum of only 10 places.

The company decided to change to Kennametal to increase their tonnage per shift. They have found that Kennametal U-1 Bits give them greater production, as expected, by cutting 100 places to the other bits' 10. Important *additional* savings in time, power output, and bit sharpening costs were also effected. *Overall savings,* mine executives estimate, *amount to 5¢ per ton.*

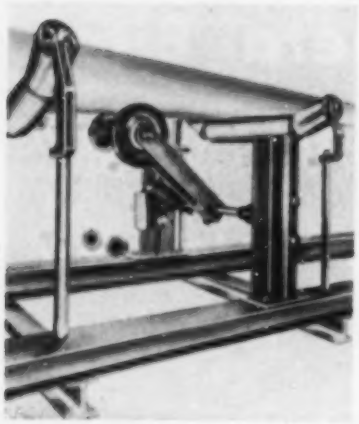
Kennametal Bits give outstanding service because of their practical, proven design, and because their tough, Kennametal tips have shock and wear-resistant qualities equalled by no other tungsten-carbide in the coal industry. Your Kennametal representative —a veteran mining man—will gladly go into your mine to demonstrate and prove how these Kennametal advantages can reduce *your* cutting or drilling costs. Get in touch with him today!

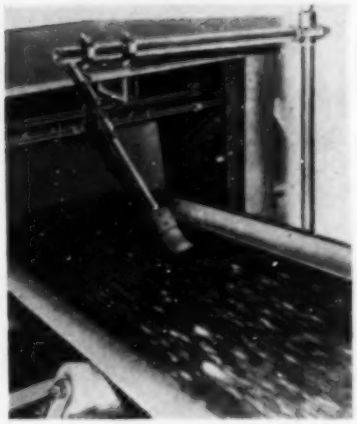
Kennametal Inc., Mining Tool Div., Bedford, Pa.

KENNAMETAL®

Quality Carbide Of The Coal Industry

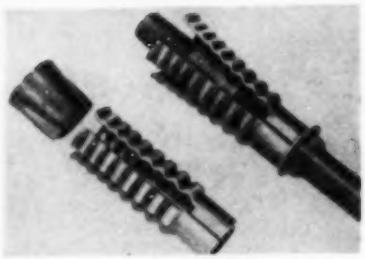
World's Largest Manufacturer of Tungsten-Carbide Mining Tools





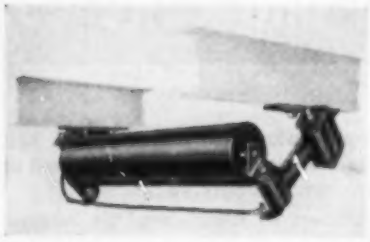
Conveyor-Moved Switches Control Varied Operations (3)

Two control devices for use on conveyors and chutes now available from Johnson-March Corp. are adaptable to any materials-handling system for activating signal lights, auxiliary conveyors or other controls. The Model UB automatic conveyor control (left photo) is designed for installation under belts from 16 to 48 in wide and is especially useful with belts conveying coarse, abrasive or lump material, the maker says. A deflection of as little as 1/16 in on the belt actuates the limit switch arm. The Model 4A automatic conveyor control (right) is installed over the conveyor belt to open and close the switch control by means of a paddle arm. It is recommended by the maker primarily for fine, lightweight materials which would not deflect the belt, or for use on chutes, pan and roller conveyors, and comes complete with pipe and brackets to fit any size conveyor belt. Said to be easy to install and operate, both controls can be used to start and stop primary and secondary conveyors automatically. More data from Johnson-March Corp., Philadelphia, Pa.



EXPANSION ANCHOR FOR ROOF-BOLTS (4)

Newly developed "Roof-Lock" steel expansion anchor for roof bolting features work-hardened ribbing, which increases in depth from top to bottom for tightening in drilled holes of varying diameter, and a large bearing surface from the multiple points of pressure contact. Other features cited by the maker include: heavy-gage steel construction, sharp edges on the upper surface for quick starting, corrosion-resistant finish, maximum bearing surface between plug and inside surface of the sleeve and possible expansion entire length of sleeve. Designed for ¾-in-diameter bolt, the anchor has an efficiency range for maximum holding power of 1⅜ to 1⅝ in hole. Circle No. 4 on postage-free card for full information, samples and prices from Mining Products Div., Equipment Corp. of America, Cleveland 14.



RETURN BELT IDLER (5)

New Rex Style No. 41 roller-bearing belt-training return idler is said by the maker to provide automatic alignment for the return belt without side guide idlers and greatly reduce the danger of damage from belt roving. The idler consists of a dead-shaft roller-bearing return roll, mounted at each end to a toggle-like arrangement of swivel arms suspended from the conveyor framework at an angle of approximately 45 deg in the direction of belt travel. It is furnished with standard 5- or 6-in-diameter steel return rolls. Style No. 41RC idler, with a standard 5½-in-diameter rubber-covered spiral return roll, also is available. Full details from Chain Belt Co., Milwaukee 1, Wis.

SINGLE-PHASE MOTORS (6)

New Westinghouse CAP-2 single-phase motor that is both capacitor-start and capacitor-run is made in 5-, 7½-, and 10-hp ratings, and is a 4-pole, 220 v, 60-cycle motor. Capacitor-run motors operate very efficiently at near-unity

power factor, their design is such that starting current is reduced about 25%, with the same high starting torque, and elimination of the wound rotor, brushes and commutator of the previous repulsion-induction design also makes for a simpler motor with less maintenace and no sparking, the maker points out. Further information from Westinghouse Electric Corp., Pittsburgh 30.

FRONT-END LOADER (7)

New Drott 6K3 Skid-Shovel, designed and built for mounting on the TD-6 International tractor, is said by the maker to offer various features of the larger models, including: clean design, job versatility, break-out action, Hydro Spring for reducing shocks, shoe transportation and reverse cylinder action.

It has a ⅞-yd capacity with a digging- or breaking-out force of 8,500 lb and a lifting capacity of 3,000 lb. Complete specifications from Drott Mfg. Corp., Milwaukee 8, Wis.

METAL DETECTOR FOR CRUSHERS (8)

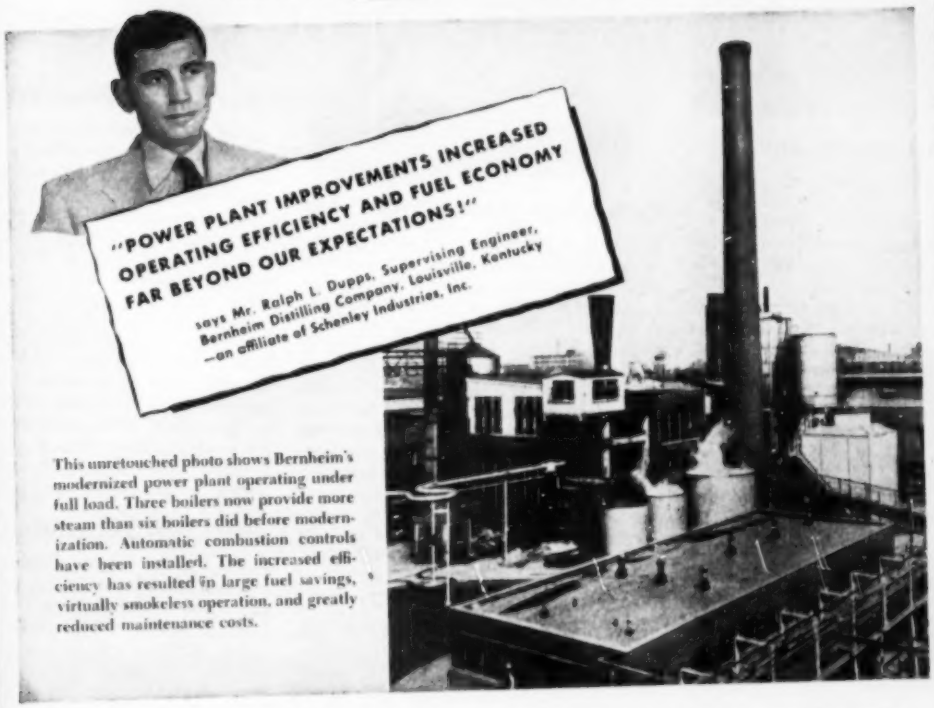
A new metal detector especially engineered for protection of crushing machinery has been developed by the RCA Victor Div., Radio Corp. of America, Camden, N. J. Normally installed between the primary and secondary crushers, the unit consists of the detector itself framing the aperture through which the conveyor passes and a small control unit. Applicable to a variety of primary belt conveyors, the unit will detect any pieces of tramp metal, magnetic or non-magnetic, large enough to damage the crushing machinery, but will not stop

TO HELP SELL COAL...

BCI Advertises to the Industrial, Commercial and Institutional Markets.

Each month, full-page messages like the one shown below—featuring either "off-track" or "on-track" installations—appear in the pages of *Business Week, Nation's Business* and a carefully selected group of power journals and trade magazines.

"WE CUT OPERATING COSTS $67,000 A YEAR— BY BURNING COAL THE MODERN WAY!"


"POWER PLANT IMPROVEMENTS INCREASED OPERATING EFFICIENCY AND FUEL ECONOMY FAR BEYOND OUR EXPECTATIONS!"
says Mr. Ralph L. Dupps, Supervising Engineer, Bernheim Distilling Company, Louisville, Kentucky —an affiliate of Schenley Industries, Inc.

This unretouched photo shows Bernheim's modernized power plant operating under full load. Three boilers now provide more steam than six boilers did before modernization. Automatic combustion controls have been installed. The increased efficiency has resulted in large fuel savings, virtually smokeless operation, and greatly reduced maintenance costs.

Why not take *full* advantage of coal's economy? Cut your operating costs to a minimum with automatic coal- and ash-handling equipment. Get more steam for every dollar with an up-to-date combustion installation.

Whether you're building a new plant, or planning to modernize, a consulting engineer can show you how you can get big savings by burning coal in a modern plant designed to meet your *specific* needs.

Consider, too, that of all fuels, coal alone has virtually unlimited reserves. And America's coal industry leads the world in efficient, economical production. That means that, unlike other fuels, ample coal will be available in the future—and at relatively more stable prices.

If you operate a steam plant, you can't afford to ignore these facts!

COAL is in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association, Washington, D. C.

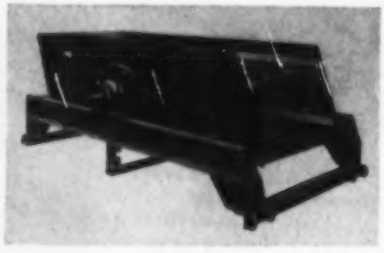
FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

operations for small unobjectionable metal objects, the company says. It can be used to activate any kind of signaling device or to stop the conveyor belt and will handle conveyor speeds up to 600 fpm, it is said. Full data from RCA.

NORWEGIAN-TYPE IDLERS (9)

Conveyor-belt edges will not rip, fray or tear if held on course by this simple adaption of the hyperbolic principle, according to the manufacturer. Invented and used successfully in Norway, the unit is named a Guidler because it serves as an idler as well as a guide, presenting a long, smooth yielding surface to the belt edge instead of a single striking point. It not only returns the belt to its proper course without injury, but can also be used to control a belt within narrow distances of movement. Full information from Knapp Mills, Inc., Long Island City 1, N. Y., which is now making and distributing three sizes of Guidlers in the U. S.



VIBRATING SCREENS (10)

New 5-ft-wide series of Diamond vibrating screens in 10-, 12-, and 14-ft lengths are adaptable for any installation with a choice of 1, 2, 2½ or 3 decks. Features cited by the maker include sturdy construction engineered for hard usage, low operating and maintenance costs, a new method of reinforcing the side plates at the shaft to eliminate vibration, heavy steel plates between bearings that double side-plate strength, positive vibrating action with four-bearing construction and ample headroom between decks. Details from Diamond Iron Works, Inc., Minneapolis 11, Minn.

AIR OPERATED CHAIN HOIST (11)

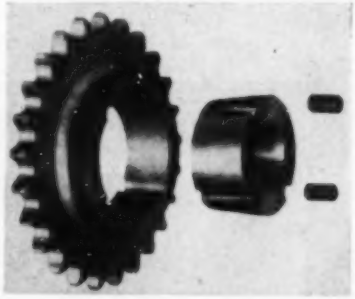
New Aro Model 7700 roller-chain rotary-valve air hoist weighs only 28½ lb yet can lift 1,000-lb loads at a rate of 40 fpm. Throttle control regulates lift, providing any speed from 0 to 40 fpm, and varied safety features include locking of load in case of airline failure. The vane-type motor is totally enclosed and is unaffected by dirt, fumes or heat. Bulletin 5313-T with more details from Aro Equipment Corp., Bryan, Ohio.

TWO DUMP-TRAILER UNITS (12)

Two new telescopic-hoist dump trailer units specially engineered to increase legal payloads and improve dumping performance now are available from Hercules Steel Products Corp., Galion, Ohio. Offered as standard packages are a 17-ft single-axle trailer with 10- to 17-cu yd capacity and a 20-ft tandem-axle unit with a capacity from 12 to 26 yd. Highlight of the new design is the extreme front mounting of the hoisting mechanisms, said to provide lower hydraulic-pump pressures, improved per-axle gross loadings, better over-all dumping stability and up to 2,000-lb increase in legal payloads. Bulletin 101 from company.

MACHINERY CLEANER (13)

New self-contained heavy duty all-electric jet cleaner, said to be safe from fire hazards, combines a built-in source of high-pressure steam and the Sellers Injector Hydraulic Jet. Announced by Livingstone Engineering Co., Worcester 5, Mass., the unit is called the Speedylectric Hydrosteam. It is available in both stationary and portable models and features a Livingstone Speedylectric steam generator, said to be free from flames and smoke, self-regulating, 98½% efficient. According to the maker, the built-in Sellers hydraulic unit provides a solid jet of superheated water and detergent, propelled under extremely high discharge pressure and temperature. It is available for 220-, 440- or 550-v, 3- or 2-phase, 60- or 25-cycle power.



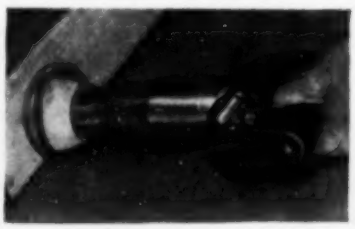
ROLLER-CHAIN SPROCKETS (14)

New Link-Belt roller-chain sprocket wheels with taper-lock bushings, available for immediate delivery and rapid installation, can be securely mounted on a shaft without reboring, equivalent to a shrink fit, and action of the taper lock bushing assures tight fit within the full range of normal shafting tolerances, the maker says. Set screws force and hold the split tapered bushing in the tapered bore of the sprocket wheel, causing it to lock tightly onto the shaft, and both assembly and disassembly are simply handled. The new line for ½-, ⅝-, ¾-, 1- and 1¼-in pitch single-width chains are now available from stock. A 16-p Booklet 2449 giving detailed data is offered by Link-Belt Co., Chicago 1.

DIESEL LINE EXTENDED (15)

The power range of Murphy diesel engines has been extended upward with the addition of four new models with a bore of 6⅜ in and a stroke of 6½ in. Their addition makes 25 models now offered by Murphy Diesel, ranging in output from 90 to 240 hp. The new Model 24 is rated at 185 hp, continuous; Model 124, 210 hp; Model 224, 200 hp; and Model 324, 225 hp. Models 24 and 124 are designed to operate at 1,200 rpm continuously; Models 224 and 324, at 1,400 rpm continuously. Full details from Murphy Diesel Co., Milwaukee 14, Wis.

Equipment Shorts You'll Want to Check



(16) STUD DRIVES—A new design feature of the Velocity-Power Driver, cartridge-actuated tool for setting studs in concrete or steel, is a permanently attached spall or protective shield, which may be turned out of the way for close-to-the-wall jobs. Used for rapid setting of studs, the unit features an integral cartridge eliminating the need for matching and fitting and interchangeable barrels that permit driving of either ¼- or ⅜-in studs. Studs available are either solid head, or internal- or external-threaded. Details from Velocity Power Tool Co., Pittsburgh 8.

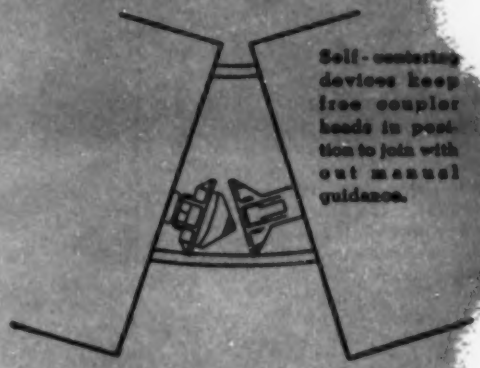
Ready to Join ANYWHERE, ANYTIME

O-B Couplers are Always in Position

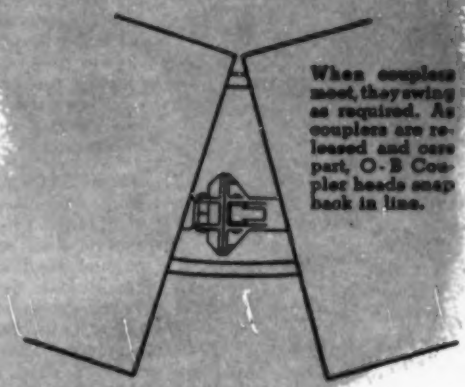
Self-centering devices hold each O-B Coupler head in line with its car centerline. Thus unengaged O-B Automatic Mine Car Couplers are ready to join at any point along the haulage way. Cars come together and fasten without guidance or assistance of any sort, because each self-centering O-B Coupler is in position to join with its mating head on the next car.

Once joined, the couplers of course swing to either side as required by the trip movement. But the moment a car is released, its coupler snaps back into position in line with the car center.

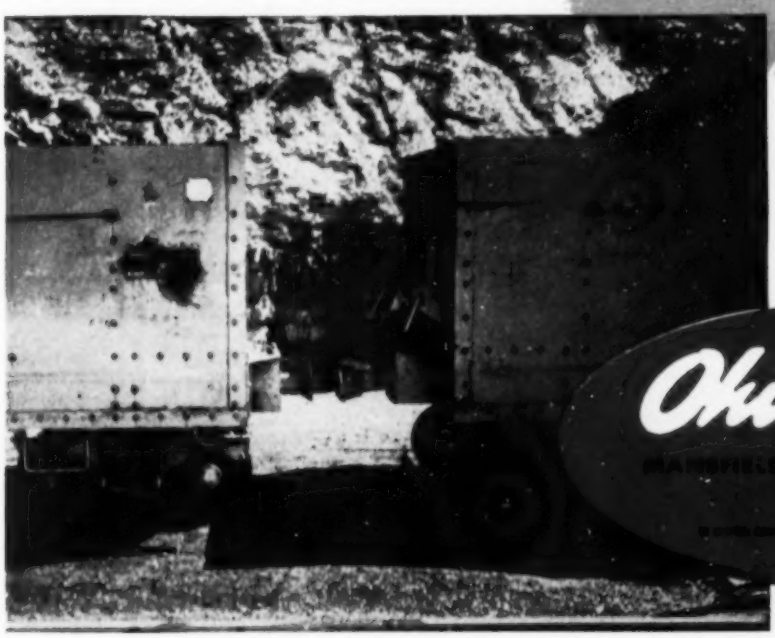
Because of their ability to join anywhere without adjustment or guidance, self-centering O-B Automatic Mine Car Couplers add speed and safety to haulage operations. That's one pretty good reason for choosing O-B for your new or remodeled cars!



Self-centering devices keep free coupler heads in position to join without manual guidance.



When couplers meet, they swing as required. As couplers are released and cars part, O-B Coupler heads snap back in line.



Just before coupling. Self-centering mechanisms have both heads in line with one another. No assistance is necessary.

Ohio Brass

MANSFIELD OHIO, U. S. A.

4555-AMJ

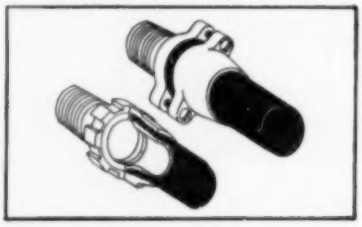
(17) ADJUSTABLE TORQUE-LIMITING CLUTCHES that provide overload protection for machine drives in a wide variety of equipment have been announced by Morse Chain Co., Detroit 10, Mich., which offers Bulletin S-31-53 with full details. The compact slip-type friction clutches act as automatic shear-pin mechanisms and avoid the time and labor required to insert new shear pins and are particularly adapted to roller-chain drives. They are made in 4½-, 5½-, and 6½-in-diameter sizes with ratings of 55, 121.5 and 260 ft-lb, respectively.

(18) FOR SMALL-PARTS STORAGE, "Little Gem Tiny Parts Cabinets" consist of two 1½-in-high drawers in a one-piece welded frame, having an over-all size of 3¼ x 11 x 11 in. Each drawer is furnished with eight dividers, giving the cabinet a total of 24 adjustable compartments and adding extra dividers can make a total of 56 per unit. Units may be stacked in one solid, sturdy assembly, or placed in a Precision all-steel standard parts cabinet. Full details from Precision Equipment Co., Chicago 41.

(19) HYDRAULIC CABLE CUTTER—Fully portable unit weighing 30 lb has a capacity up to 3½ in. lead-sheathed and power cable (except submarine cable) up to 3,000 MCM. It rests solidly on floor or flat surface and features a long swivel-type handle that eliminates stooping and may be operated at any angle, requiring seven handle strokes per inch. The 10,000-lb hydraulic jack is self-retracting and may be stopped at any desired cutter opening. Bulletin 575 from H. K. Porter, Inc., Somerville 43, Mass.

(20) SUBMERSIBLE SUMP PUMP—The new Kenco Model 109 is designed for use in sumps, as a portable pump and for general utility use. The entire unit, motor, pump and switch is watertight for operation completely emersed. It will fit into a 12-in cube and has a maximum capacity of 3,300 gph at 10-ft head. Major improvement over previous models is the redesigned liquid-level control switch, which has no weights, floats, tricky "displacements" or electrodes to fail and is available for automatic or manual operation. Details from Kenco, Inc., Lorain, Ohio.

(21) ELECTRICAL INSULATION—More compact design and more reliability of all types of electrical equipment are made possible by a new Class H silicone rubber-coated glass cloth insulation with unusually high dielectric strength and increased tensile strength, the maker says. Both the electrical grade, E-944, and the mechanical grade, E-959, possess excellent bending qualities, and the mechanical grade has a surface toughness three or four times greater than previous silicone rubber coatings, suiting it for gaskets, it is reported. Data sheets from Mica Insulator Co., Schenectady 1, N. Y.



(22) PLASTIC-PIPE CONNECTORS—Barracuda brass non-slip fittings for connecting plastic piping are designed so that the barracuda teeth grip the plastic inside and outside of the pipe for secure, permanent joint. They do not cut down flow through the pipe as they require no space inside and are easily removed for reuse many times with full efficiency, the maker says. Available from ½ to 2 in. Bulletin AF-200 from Nelson Foundry Co., Morton Grove, Ill.

(23) FLEXIBLE HOSE—New, inexpensive, easily handled Portovent flexible hose for fume exhaust and ventilation applications is said by the maker to have unusual lengthwise compressibility and excellent air flow characteristics, maintain a large cross-section even on sharp bends and be easy to install, transport, handle and store. Made from cotton or nylon fabrics, impregnated with Neoprene compound and spiral-wire-reinforced, it can be supplied in diameters from 4 to 36 in, in any desired length and can be easily cut to size in the field. Full data from American Ventilating Hose Co., New York 17.

(24) WELDER—New DC rectifier welder in 200-, 300- and 400-amp ratings is designed as a heavy duty unit built for day-in and day-out service in production welding. Its design incorporates fan-forced, up-draft ventilation which provides unusually cool operating temperatures and assures long rectifier life, the maker says. Full data from Metal & Thermit Corp., New York 17.

(25) WATER HOSE—New horizontal-braided Revolc water suction hose, developed by Quaker Rubber Corp. Div. of H. K. Porter Co., Inc., Philadelphia 24, is especially designed for both pressure and suction handling of water. Available in 1¼- to 3-in sizes, the hose is light in weight, will not kink or collapse, maintains full opening in any position, and can be grounded to eliminate static electricity, the maker says.

(26) BIN-LEVEL INDICATOR—All-new Bantam Bin-Dicator is a lower priced, more versatile refinement of the original unit designed for use in hoppers, bins, chutes, etc., where installation space is too limited for the larger standard-model Bin-Dicators. Over-all diameter of the new Bantam is but 5¾ in, and the housing is so designed that it may be mounted on the outside of thin-walled bins, inside of thick-walled or multiple-compartment bins or suspended within bins. Full details from Bin-Dicator Co., Detroit 15, Mich.

(27) POWER FASTENER—New "Plus-Power" Jobmaster power-actuated fastening tool does medium-duty fastening into heavy-gage steel and thick concrete at one-third less operating cost than any so-called heavy-duty tool made, the maker reports. It has a ⅜-in barrel, which also is produced as a separate lower assembly for fitting to the Jobmaster tools with ¼-in barrels. Operated with one hand, the unit weighs 6¾ lb and uses either threaded studs or flat-head drive pins. Details from Ramset Div., Olin Industries, Cleveland 11.

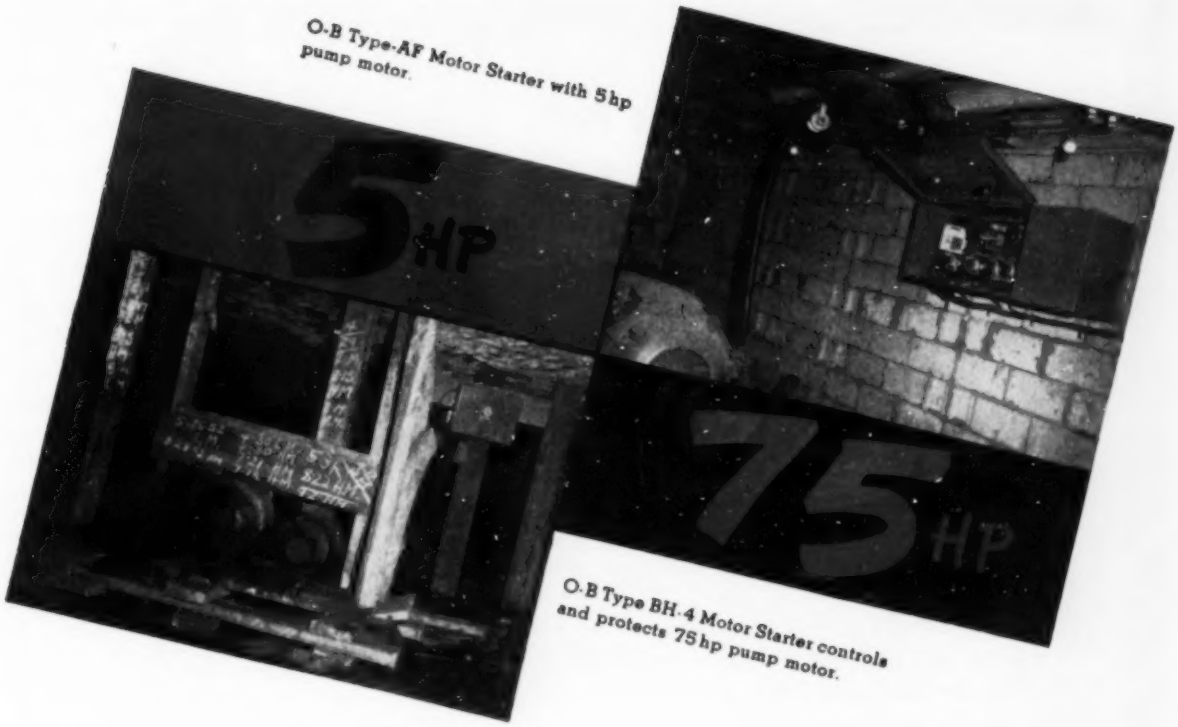
(28) PORTABLE COMPRESSOR—New 210-cfm compressor of high speed 2-wheel trailer design, the Super Chief Model 210-WDS, is said by the maker to be lightest, most compact compressor ever built of this capacity. The compressor unit is of W-series design and is equipped with newly-developed Davey Multi-Port valves, which are said to increase by 15 to 25% the air delivered per pound of fuel. Data from Davey Compressor Co., Kent, Ohio.

EQUIPMENT BULLETINS AVAILABLE

(41) BELTING MANUAL, a new, "simple-to-understand" 48-p technical manual on transmission, conveyor and elevator beltings is being offered by the Boston Woven Hose & Rubber Co., Box 1071, Boston 3. Although designed principally for engineers, each of the three major divisions contains a general information section comprehensively covering every aspect of each belting as a useful reference for the non-engineering group, with various tables, charts and diagrams.

(42) VIBRATING SCREENS—Bulletin 55 on Deister Heavy-Duty Types ETP (End Tension, Pillow-Block) and ETU (End Tension, Unitized) high-speed vibrating screens is offered by the Deister Machine Co., Fort Wayne 4, Ind. Specific operational features of the ETP and ETU units are described, with performance characteristics, size ranges and motor mountings, plus details on the Deister elliptical throw and longitudinally-curved screen-cloth surface.

(43) CYCLONE THICKENER—Test and performance data, on the new H&P "Jet-Injection" cyclone, together with operating and design advantages, are presented in a bulletin available from Heyl & Patterson, Inc., Pittsburgh 22.



O-B Type-AF Motor Starter with 5hp pump motor.

O-B Type BH-4 Motor Starter controls and protects 75 hp pump motor.

O-B Starters Protect Both Motors

(and everything in between)

Pick an O-B Motor Starter for a close match with any of your motor ratings. Choose from six starter sizes for motors from 5 to 75 horsepower. For most uses, you'll find a choice between one-and two step starters, or between two- or three-step starters.

With a selection like that, you'll always get the right starter for any application, instead of "too much starter" or "not enough." There's an O-B Motor Starter for hoists, conveyors, compressors, belt conveyors, fans, as well as the typical pump installations shown here.

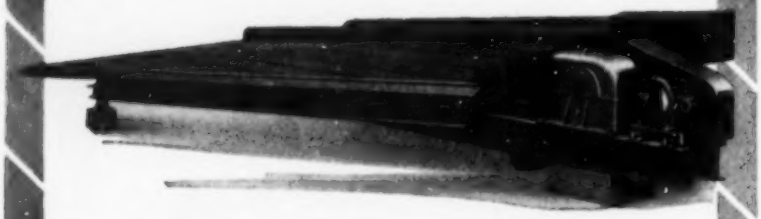
Check the O-B line for a starter that's closely rated to your job. Six sizes, with one, two, or three steps of resistance make the choice easy! Ask your O-B representative, or write to Ohio Brass Company for complete starter information. Be sure to describe the application you have in mind!

Ohio Brass

MANSFIELD OHIO, U. S. A.

4348 M

Cleaning of Fine Sizes Best Handled on SuperDuty Table

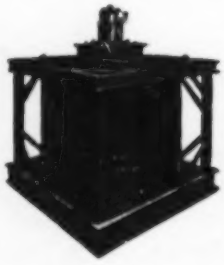


For the cleaning of fine coal sizes, the Diagonal Deck of the SuperDuty Table has proved most efficient.

Over two decades, no other process has been able to deliver such high grade washed coal products at optimum production of these fine sizes . . . with so little loss in the refuse.

The Diagonal Deck, actuated by the proved Concenco anti-friction bearing head motion, cuts fine coal cleaning costs to an almost irreducible minimum.

Records of large and small producers are available. Send for complete information and Bulletin 118-B.



CONCENCO FEED DISTRIBUTOR

The Concenco Revolving Feed Distributor is a heavily fabricated all steel machine with motor drive requiring 1 H.P. or less in operation. It effectively provides a splitting of feed into any desired number of equal portions, feeding any number of circuits or machines in battery for greater overall efficiency. Unexcelled for feeding coal washing tables.

THE DEISTER ★
CONCENTRATOR
COMPANY
901 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

(44) DIAMOND CORE DRILLING—Bulletin 330 offered by Sprague & Henwood, Inc., Scranton, Pa., provides detailed application and design data on the Series M core barrel, used in conjunction with the Series M coring bit, and said by the maker to permit a higher percentage of good core from fractured, porous or soft formations than would otherwise be possible.

(45) CENTRALIZED LUBRICATION—Farval Corp., Cleveland 4, offers 20-p Bulletin 26 on its centralized systems for automatic economical lubrication of machinery and equipment. Detailed data on application, operating features, installation, fittings and accessories are included.

(46) CONVEYING AND POWER TRANSMISSION EQUIPMENT—Chain Belt Co., Milwaukee 1, Wis., has available a 60-p Abbreviated Catalog 53-110 providing detailed data, including sizes, dimensions, prices, etc., on its Rex line of power-transmission and conveying equipment. Covered are such products as: cast and steel chains, sprockets, belt idlers, elevator buckets, take-ups, spray nozzles, etc.

(47) ROCK-DRILL BITS are listed and described in a new 24-p booklet from Brunner & Lay, Inc., Franklin Park, Ill. Covered are tungsten-carbide Rok-Bits; carbide-insert Intra-Set drill steel; hollow drill steel; paving-breaking, clay-digging and asphalt-cutting tools; pneumatic star drills; and chipping hammer tools.

(48) SCREENS, FEEDERS AND CONVEYORS made by the Simplicity Engineering Co., Durand, Mich., are illustrated and described in detail in a new 28-p Catalog 53 offered by the company. Covered are horizontal screens, scalpers, SimpliFlo screens, single-, double- and triple-deck tray-type screens including the ball-tray-deck screen that handles damp, sticky materials without build-up or blinding, and various Simplicity feeders and conveyors.

(49) FEEDERS—Hardinge Co., Inc., York, Pa., offers a new 12-p Catalog 33-E on regulating-type feeders. It covers design details, capacities, dimensions and application of Hardinge constant-weight, weight-measuring, volumetric belt, disc and volumetric non-flooding drum feeders, used to control transfer of materials from bins or hoppers to conveyors, etc.

(52) ELECTRIC SHOVEL — Marion Power Shovel Co., Marion, Ohio, offers Bulletin 408 describing in detail the Marion 111-M Ward-Leonard electric shovel. The unit carries a standard 4-yd dipper or bucket and is featured as shovel, dragline, clamshell, crane and coal loader. As dragline, the bucket capacity varies from 3 to 4½ cu yd, and its rated crane capacity is 165 tons.

(53) MOTOR STARTERS — Allis-Chalmers Size 0-3 AC across-the-line motor starters are described in new Bulletin 14B7132A covering manual and magnetic types of starters, and combination and reversing starters, as well as push-button control stations. Operating ar-

STOP
cause of wire wear!

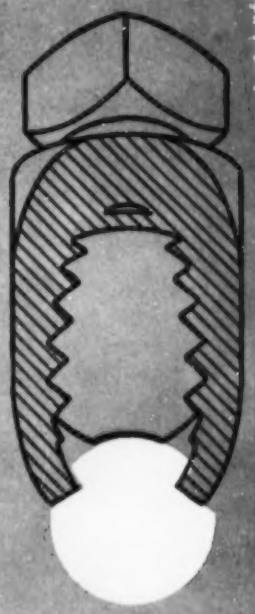
Use O-B Smooth Underrun Fittings

Build long life into your overhead system with O-B Smooth Underrun Trolley Materials!

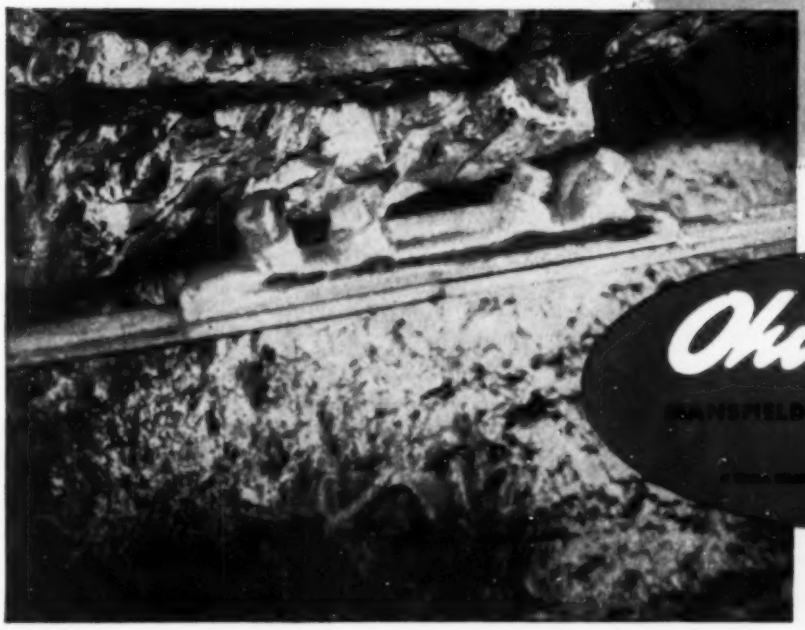
Every O-B Smooth Underrun fitting holds formed wire without encircling it. Contour of every O-B Smooth Underrun fitting blends into the contour of the wire. Thus there are no bumps or jogs in the trolley wire—either along the underrun or on the sides of the wire at any wire-holding point.

Wire life depends greatly on the performance of current collectors. When they bounce, arcing and burning pits the trolley wire. Pits and lumps on the wire surface promote wear; decrease service life of the wire. O-B Smooth Underrun Trolley materials prevent this wear by preventing the cause — *they do away with bumps in the current collector path.*

Bump-free, arc-free trolley wire lasts a long time. Build this long life into your overhead system with O-B Smooth Underrun Trolley Materials!



Cross section of O-B Bulldog Trolley Wire Splicer shows how this (and all other) Smooth Underrun fitting blends into contour of wire.



O-B Bulldog Splicers join wire ends without making a jog in the current collector path.

Ohio Brass

MANSFIELD OHIO, U. S. A.

4336-M

YOU hold the watch!

If you want to know whether you're getting the most out of your earthmoving rigs, here's how to find out.

On your own job, under any conditions you choose, *time* the work cycle of a Cat* DW21 Tractor and No. 21 Scraper against any other make of similar equipment. Or, if you're using four-wheel tractors, make the same comparison with a DW20 or a DW10 unit. Check the yardage handled in an hour—or a day.

We have enough confidence in the big yellow Caterpillar rigs to believe they'll sell themselves in any such test. And your dealer is ready to give you a demonstration. Fair enough? Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks —®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

USE THIS CARD

. . . TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, fill out and mail. No postage is needed.

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (Aug., 1953)

1	7	13	19	25	43	49	55	61	67	73	79	85	91
2	8	14	20	26	44	50	56	62	68	74	80	86	92
3	9	15	21	27	45	51	57	63	69	75	81	87	93
4	10	16	22	28	46	52	58	64	70	76	82	88	94
5	11	17	23	41	47	53	59	65	71	77	83	89	95
6	12	18	24	42	48	54	60	66	72	78	84	90	96

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

.....

Name (Print) ..... **Position** .....

Company .....

Address .....

NOT GOOD if mailed after Oct. 1, 1953

rangements and three types of enclosures are given, along with motor voltages and horsepowers. Available from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

(54) **TRACK ACCESSORIES**—Time and money savings through single-source buying are pointed up in a new catalog titled, "Track Accessories and Tools," issued by the L. B. Foster Co., Box 1647, Pittsburgh 30. The 32-p Catalog 575B covers a wide range of track accessories and track tools in detail.

(55-62) **HARDFACING**—For added service life of equipment parts, American Manganese Steel Div., American Brake Shoe Co., Chicago Heights, Ill., offers hardfacing welding procedure sheets, detailing application, correct rod and amount needed, and procedure for hardfacing. Circle numbers listed on the postage-free reply card for sheets on the following applications: (55) coal-crusher hammers; (56) coal-crusher teeth; (57) coal-gathering head; (58) coal-pulverizer hammers; (59) conveyor screws; (60) diesel-engine valves; (61) tractor-drive sprockets; (62) tractor rails.

(63) **CENTRIFUGAL PUMPS**—Bulletin W-300-B4, offered by the Worthington Corp., Harrison, N. J., covers its line of six SESC (Standard End Suction Centrifugal) pumps providing an over-all line of centrifugal pumps for a wide variety of applications, with a wide range of mountings, frames and drives.

(64) **SHOVEL-LOADER**—Bulletin 938 from The Tractomotive Corp., Deerfield, Ill., provides full operating and specification data on the Model TL-10 Tracto-Loader, a rubber-tired unit with a ¾-yd bucket featuring a hydraulic torque-converter drive and clutch-type transmission with four speeds forward and reverse.

(65) **MATERIALS HANDLING** — New methods in bulk and package materials handling that reduce operating costs for industry are pictorially described in the new 12-p "Modern Materials Handling" booklet offered by the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Included are crawler and industrial wheel tractors, motor graders, power units, and rubber-tired earth moving equipment recently added to the A-C line, with basic data.

(66) **DRIVE AND CONVEYOR CHAINS** —Chain Belt Co., Milwaukee 1, Wis., offers new Bulletin 53-59 describing the newly improved Chabelco Chains. Designated as the R and RX Series for drives, and RR Series for conveyors, they are said by the maker to provide higher strength, longer life and smoother performance.

Films for Company Or Group Showings

(50) **BLASTING**—A new 15-min, 16-mm sound film, "The Inside Story," is designed to show how modern methods make an orderly and controlled sequence of events almost precisely adaptable to the type of rock, surroundings and specific result desired. It is available for showing before mining, quarrying and construction engineers at company meetings or in professional society sessions from the Atlas Powder Co., Wilmington, Del., or various offices. The film explains the principles of blast detonation, discussing not only millisecond-delay blasting but also a new refinement known as alternate velocity loading.

(51) **POWER SHOVEL**—Marion Power Shovel Co., Marion, Ohio, offers a 12½-min, 16-mm color-sound film on its new 191-M shovel, called the world's largest and most powerful shovel on two crawlers. It shows both the all-electric and diesel-electric models of the 191-M with 11-yd dippers loading truck haulage units in the 50-ton class in three and four passes. The camera also gets inside the housing of the 191-M to bring out special design, space, and service features. Marion also offers interested organizations and companies another film (color-sound, 18-min) titled "Marion and You," featuring the company's entire line of material-handling excavators.

CARD USERS NOTE—Please be sure to give your name, position and company to insure proper handling of your request. Since some cards have been received without names, we would be glad to have you check us if you have no response to your request within a reasonable time.

(67) **DIESEL ENGINES**—New 48-p booklet offered by Murphy Diesel Co., Milwaukee 14, gives detailed descriptions of engineering design features to look for in diesel engines. In addition, ratings and descriptions of Murphy diesel models are presented, together with 19 p of typical installations.

(68) **CAR SPOTTER**—Improved operational features of Trackmobile Model 2TM for lower cost railroad-car handling are presented in new Bulletin T-112, "Solve Your Car Handling Problems," published by Whiting Corp., Harvey, Ill. It shows applications in industries from coal mines to timber mills and includes complete specifications, performance and dimension tables.

(69) **DIESEL TRACTORS**—Four diesel-powered Allis-Chalmers crawler tractors from 40 to 175 hp are discussed "Inside and Out" in a new catalog showing details of construction of each model with full cutaway pictures and the variety of applications of each on the job. Available from the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

(70) **PRODUCTS** handled by its newly organized Standard Products Div. are listed in Bulletin 653 available from Stephens-Adamson Mfg. Co., Aurora, Ill. This new department is organized to handle the company's line of centrifugal loaders, car pullers, bin-level controls, hoists and winches, speed reducers, conveyor-belt cleaners, holdbacks and carriers, which are now available for immediate shipment from stock.

(71) **MACHINERY CLEANERS**—Bulletin 424 on Sellers hydraulic jet cleaners, operated by ordinary steam and cold-water lines, explains this low-cost, heavy duty method of cleaning machinery of all types. Applications and operating details of various models are covered. Available from Sellers Injector Corp., Philadelphia 30.

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NEW YORK, N. Y.

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NEW YORK 36, N. Y.

(72) **WIRE-ROPE FITTINGS**—Folder from Sauerman Bros., Inc., Chicago 7, contains drawings, tables and ordering data on open and double wedge sockets, pins and continuous cable clamps.

(73) **SALT-TABLET DISPENSERS**, both permanent bakelite and plastic models and throwaway types, and salt tablets and combination tablets, are described in Bulletin 0408-3 from Mine Safety Appliances Co., Pittsburgh 8.

(74) **FIRE HOSE**—Bulletin from Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia 24, describes its complete line of industrial fire-protection hose in detail, including such fire hoses as chemical and booster, single and double jacket cotton rubber lined, special flat-folding type, engine suction, forest-fire fighting and others.

(75) **"FROTH FLOTATION, Industrial and Chemical Applications"** is the subject of a bulletin recently published by Denver Equipment Co., Denver 17, Colo. Written by L. A. Roe, technical supervisor, Division of Ore Research, Jones & Laughlin Steel Corp., the bulletin mentions examples of separating near-collodial size particles from a saturated brine; fractionation of fine clays; recovery of fossil resin from coal; cleaning peas and wheat; water purification; and correcting stream pollution.

(76) **AIR HOSE**—Bulletin from Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia 24, provides performance data, construction, sizes, working pressures, couplings and recommended uses for the Quaker line of air hose.

(77) **WELDING**—An 8-p reprint entitled "Will Inert-Gas Metal-Arc Save Money on Mild Steel" being offered by Air Reduction Sales Co., New York 17, reports on the results of weld tests. It shows costs as compared to the conventional method and includes graphs and cross-section photos of weld deposits.

(78) **HOSE HANDLING** — "Dangers Under Pressure" is a new safety booklet now available from Hose Accessories Co., Philadelphia 32. It was prepared to aid hose users in securing long trouble-free service life of both hose and hose couplings by proper selection and care, in handling air, gas or steam.

(79) **PAVING BREAKER**—"The Right Paving Breaker for Every Job," Catalog 4127, provides full details on I-R series of breakers from the 14-lb J-10 to the 146-lb R-30, as well as individual tools and accessories. Available from Ingersoll-Rand Co., New York 4.

(80) **FLEXIBLE METAL HOSE**—Bulletin 15-D from the Atlantic Metal Hose Co., Inc., New York 23, covers its line of high-pressure interlocking bronze and steel flexible hose, tar and asphalt hose, loading and unloading, and necessary couplings, with current applications and full test and engineering data.

(81) **HARDSURFACING**—New 20-p edition of Lincoln Weldirectory 466 covering hardsurfacing contains a general discussion on arc-weld surfacing and an entirely new hardsurfacing guide to specific applications. Included are detailed data on application, properties and procedure for various types of Lincoln electrodes. Available from Lincoln Electric Co., Cleveland 17.

(82) **PORTABLE POWER TOOLS**—Syntron Co., Homer City, Pa., offers 30-p Catalog 537 describing its complete line of portable power tools, including: electromagnetic hammers and hammer drills, electric drills, screwdrivers, nut runners, polishers, sanders, grinders, the new electric impact wrench, self-contained gasoline hammer paving breakers and rock drills and concrete vibrators.

(83) **FILE SYSTEMS**—Remington Rand, Inc., New York 10, offers two booklets which emphasize the importance of selecting the proper filing system to suit the needs of a business. Folder LBV-395C.1 describes how modern business can save money, time and labor by using simplified indexing systems tailored to suit special needs. Folder BSD-2 describes how the Business Services Depts. of Remington Rand provides analysts and installation experts to help out with general record problems, and also describes the other services performed, such as record analysis, punch-card service, microfilming service, etc.

(84) **PIPELINE STRAINER**—S. P. Kinney Engineers, Inc., Carnegie, Pa., offers a new 12-p booklet with complete descriptions and engineering data on the Brassert and Kinney lines of automatic self-cleaning strainers and the Kinney manually-operated self-cleaning strainer. Available in 2- to 36-in sizes, the units are designed to remove fine suspended particles from raw or process water, oil, gasoline and other liquids.

(85) **STANDARD BUILDINGS** — Advantages of low-cost, permanence, speedy erection and wide flexibility of its standardized steel-frame structures are discussed in 20-p booklet "Standardized Buildings by Luria," available from the Luria Engineering Co., New York 36. The design provides more usable building space and can readily be adapted to special requirements, the maker says.

(86) **AIR COMPRESSORS**—Cooper Bessemer Corp., Mt. Vernon, Ohio, offers 44-p Bulletin M-70 with descriptive data and engineering specifications on its M-Line of compressors. Covered is use of multi-stage, multi-cylinder units, 100 to 5,000 hp with discharge pressures up to 20,000 psi, along with engineering particulars on latest automatic controls and recommended compressor installation.

(87) **PROTECTIVE HOODS** designed especially for use with MSA's dust, paint and chemical respirators are pictured and described in new Bulletin 1000-1 offered by Mine Safety Appliances Co., Pittsburgh 8.

(88) **HARDFACING ALLOYS** applied to lineal, cylindrical or contoured shapes in production of original equipment or in maintenance and repair of existing equipment, the types of products hardfaced and its service are discussed in booklet available from Cleveland Hard Facing, Inc., Cleveland 5.

(89) **BRONZE BUSHINGS**, bearings, bar stock and babbitt metal are discussed in 12-p bulletin available from the American Crucible Products Co., Lorain, Ohio. Running clearances, fits, lubrication, oil grooves, chemical and physical properties are covered in detail, along with typical case histories.

(90) **HYDRAULIC FILTERS**—Marvel Engineering Co., Chicago 6, offers 12-p Catalog 106 containing all the latest information and improvements in the Marvel Synclinal filters for hydraulic oils, coolants and lubricants.

(91) **WIRE-ROPE SLING**—Folder describing new SW-55 ACCO Registered wire rope sling, offered by the Wire Rope Sling Dept., American Chain & Cable Co., Inc., Bridgeport 2, Conn., outlines features, type of lifts it will handle efficiently, with specifications, dimensions and recommended uses.

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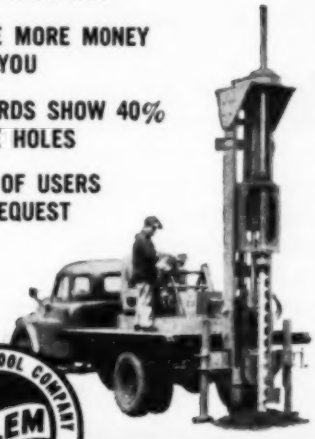

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At the famous Jurassic iron ore system in England, heavy limestone has been encountered under soil and boulder clay before reaching the ironstone. The 20-ft. slab of limestone is broken up for the dragline by the dependable McCarthy Horizontal Blast Hole Drill. Highwall is protected and left virtually intact by buffer blasting. Blast holes are drilled 60 feet deep with explosive charges being placed in the back 50 feet. Space behind the open cast gelignite is stemmed with sand. The McCarthy Blast Hole Drill is specially mounted on a shovel for faster positioning up along the wall. Three tons of explosives are usually detonated in one blast. McCarthy Auger Drills are in use all over the world for many purposes. Write Salem Tool Company direct and our representative will call on you.

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A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

One Sure Way to Get MORE DEFENSE FOR LESS MONEY

How can we get more national defense for less money? The best answer yet given to this question appears in a little-noticed section of the new defense budget. That answer, with which this editorial is concerned, is to provide more equipment with which to step up munitions production in an emergency. Thus we can eliminate much of the need to stockpile finished munitions in advance.

The new defense budget provides an appropriation of $500 million, to be invested by the Secretary of Defense in specialized facilities required to produce munitions on a wartime scale, but not adapted to profitable operation by private industry in normal times. Facilities of this type are known as "stand-by capacity."

There is no strictly political controversy over the "stand-by capacity" program. It was originally suggested by Clay Bedford, Special Assistant to the Secretary of Defense during the Truman administration. It has since been reviewed and endorsed by the Eisenhower administration. Moreover, it involves little or no technical controversy. Civilian and military experts are well agreed that the only alternative to enormous expenditures for stockpiling military equipment is to provide enough facilities for producing it quickly in an emergency.

Here is the Key Idea

In his speech of May 19, introducing his defense budget to Congress and the nation, President Eisenhower stressed the value of such reserve capacity in these terms, ***"The more swiftly and smoothly we can mobilize, the less our dependence upon costly standing armies and navies."***

In accord with this idea, the $500 million requested for the present reserve capacity program would be invested in tools that require a long time to produce, and so present grave complications in an emergency unless they are ready in advance. Some such tools would be installed in new plants that are needed to eliminate potential bottlenecks in the defense production program. Others would be ordered to replace that part of the government's present machine-tool inventory which is made obsolete by changes in the design of defense products. By completely "tooling up" with the most modern equipment, the admin-

istration hopes to realize a production potential many times greater than could be achieved by spending the same amount of money on military end-products.

Examples of Savings

In the specialized field of defense production, adequate modern capacity is the key to both economy and speedy delivery in a pinch. Here are some striking examples from the recent report of the Advisory Committee on Production Equipment (Vance Committee) to the Director of Defense Mobilization:*

—In the case of certain ammunition components, the cost of new capacity can be recovered in only six weeks of full production.

—If $500 million worth of special tools needed to make aircraft are purchased in advance, aircraft production during the first two years of war will be increased about $18 billion. In other words, it costs 1/36 as much to acquire the tools in advance as to acquire the aircraft.

—In the case of a certain ordnance item, an expenditure equal to the cost of only 150 units of the item will provide the capacity to produce thousands and save three years' time in meeting mobilization requirements.

Moreover, reserve plants and equipment can be kept up-to-date at only a small fraction of the cost required to maintain an up-to-date reserve of military end-products. The cost of replacing 5,000 obsolete tanks is at least $1 billion. The cost of new tools for a tank plant would be less than 10% of that amount.

*This Committee, headed by Mr. Harold Vance, President of the Studebaker Corporation, included Clay Bedford, then President of Chase Aircraft, Manly Fleischman, former Defense Production Administrator, and several retired military leaders with wide experience in procurement.

Savings Will Multiply

On the basis of facts like these, the Vance Committee recommended that the Defense Department spend $500 million to $800 million per year on specialized defense production facilities in order to provide substantial reserve capacity as soon as possible. It also recommended that expenditures for military end-products which get obsolete rapidly be held to a minimum. The Eisenhower administration has adopted this approach to the problem of munitions production in asking that $500 million be invested in reserve capacity.

The importance of this approach is much greater than is indicated by the amount of money to be spent on new tools, although this amount will go far toward assuring a healthy machine tool industry, adequate to meet emergency demands. ***What is really important is the great saving that can eventually be made in the cost of our defense program by a modern tooling program.*** If we are to maintain this program for a long period, and if we are to pay as we go, we must have a low-cost program. No other plan to reduce and control the cost of a garrison economy can compare with the new approach suggested in the Vance Report and now embodied in the new defense budget.

Congressmen will do well to scrutinize all military appropriations carefully. They have a chronic tendency to be too big. But there should be no penny-pinching on investments in capital equipment that will pay out in as short a time as six weeks in a war emergency. It would be tragic if this opportunity for real economy were lost in the controversy over other aspects of the defense program. ***The tooling program is a key part of the Eisenhower effort to cut defense costs. It should be promptly approved.***

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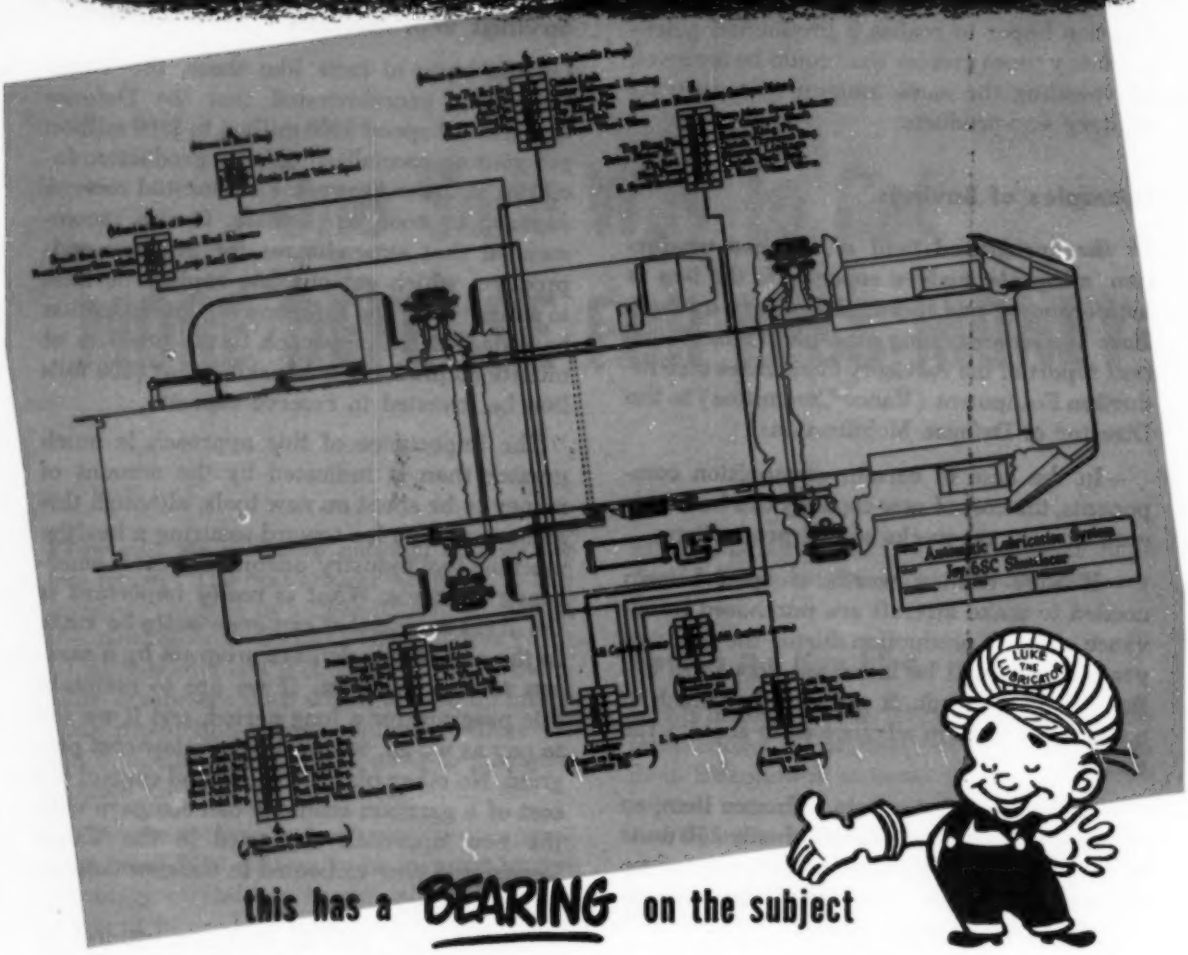

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News Round-Up

Moody Asks New Approach As Moses Denies Captive Rule

Calling for a new approach to the problems of the bituminous industry, Joseph E. Moody, president, Southern Coal Producers' Association, warned that without such an approach the southern operators face "economic ruin." In an address before the Exchange Club Charleston, W. Va., July 23, he charged that coal's affairs have been dictated by a group of northern operators, including the captive mines. This brought a rejoinder from Harry M. Moses, president, Bituminous Coal Operators' Association, that such charges are "loose and unfounded."

A "welfare policy" for the entire industry rather than the miners alone is coal's big need, Mr. Moody declared in citing the closing of 103 mines in his association's area in the 17 mo ending May 31, with 14,000 men jobless and an annual production loss of 15,000,000 tons. "It is about time," he asserted, "to decide whether we are going to starve to death quietly . . . or to come to grips with our situation."

Sole hope for the southern producers is lower cost. "We cannot hope to reduce costs appreciably through the purchase of more machines," said Mr. Moody. Therefore a demand for a wage boost this fall would leave many companies only the choice of closing down or trying to operate non-union.

Mr. Moody denied that the southern operators had agreed at this date to give notice of contract termination but he did discuss some ways to reduce costs and thus hinted at demands the southern group may serve on Mr. Lewis if the contract is terminated Sept. 30. These were:

1. Wage Differential — Abolition of wage differentials, which favored southern producers by about 10% under the northern scale, took place in 1941 "at a conference at which the southern operators were not represented" but the reasons for the differential remain.

2. Domination by Outsiders — Southern producers "have been marching at the command of others. We seem to have lost control of our destiny." Affairs have been dictated by the UMWA and a group of northern producers, including the captive mines.

3. Miners' Wages and Earnings — "Wages in coal today average $19.67 daily," higher than in automobiles, railroads, steel and manufacturing. But while rates have gone up "to heights once thought unattainable," actual earnings of miners have gone down because of curtailed working time.

4. Incentive Wages—Many non-union miners work on an incentive basis. Output in non-union mines is higher than in similar union mines.

5. Non-Union Operations—The trend toward non-union operation has been accelerated and some substantial producers in the southern fields now are paying "gang" rates and are obtaining high productivity from workers.

6. Wildcat Strikes — In 1952, SCPA members suffered from 411 wildcats. There is no penalty for such strikes and they continue year in and year out.

7. Welfare—Many welfare payments are for something that has no relation to mining. The fund is drawing down its reserves but instead of curtailing costs, it always demands a higher levy. The industry feels responsible for employees injured at their jobs but "it is not in a position to embark upon an ambitious social project with demands which are endless."

Crystal Balls Emerge As Contract Season Nears

The wage agreement between coal operators and the UMWA doesn't carry an expiration date. It cannot be canceled by either party before October 1. Sixty-days' notice is required for cancellation. Thus the tip-off on whether the existing agreement will be permitted to stay in force or a new contract will be negotiated could come as early as August 1. The forecasters already are in business. The *Wall Street Journal*, July 8, published a story by Stephen K. Galpin, staff reporter. Four days earlier, *Business Week* had come out with another line of thought.

"New Revolt in Dixie?" Asks Wall St. Journal

"A bold band of hard-pressed producers in the Dixie diggings, losing money on every ton they mine," soon may call for a showdown with Mr. Lewis. Their demand: A wholesale rewriting of the contract, even at the cost of a long strike, to cut mine-labor costs. There they will stand until the men come back to work—maybe not union. Such a strike would be rough on the mines and miners involved but, since the dissident group mines less than 5% million tons a year, wouldn't hurt anybody else much. But success would be a blow to UMWA prestige.

The group has made no firm decisions and is under strong pressure from northern operators and some of their fellow southerners to do nothing. "The rebel group" makes up about half of the membership of the Southern Coal Producers' Association and includes only commercial producers, who are being squeezed by weak demand for coal, low prices and the competition of non-union mines. Their opponents within SCPA are equally hard pressed but believe that now is not the time for a fight, or that a fight would be futile, or that it would be unwise to provoke a strike at the start of the coal-buying season.

The belligerent group aims at cost cuts mostly. They therefore may ask Mr. Lewis for a favorable wage differential, a cut in the welfare levy, an incentive wage system and an end to costly wildcat strikes.

"New Kind of Wage Deal?" Asks Business Week

Mr. Lewis may ask for high wage rates for prosperous mines, lower rates for marginal mines. The wage boost for companies that are making money would run something above the 8 to 9¢ won by the steelworkers. Companies that claimed they couldn't pay the boost would be exempt from the increase if they brought in their books and proved hardship.

Assume a 15¢-per hour raise. Top companies would pay it all. Companies not so well off might get by with 10¢. Companies "deep in the red" might be permitted to continue paying the present rate. The books of each exempted company would be re-examined each month. If, after a period of exemption a company began to make money, it might be required to make up the difference.

The results would be as follows:

For Mr. Lewis—A big wage increase, with flexibility that would make him look like an industrial statesman.

For most of the operators—Big producers would have nothing to gain and everything to lose, but marginal firms would have easier going—until they got on their feet, anyhow. The scheme doubtless would drive wedges in recently created solid bargaining fronts.

The UMWA—With the power to tax (in the form of wages), the UMWA would be able to control production. Also, the union would maintain its membership in areas where unemployment would grow under a uniformly applied contract.

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New Mine Developments

New Company Leases Land For 500,000-Ton-a-Year Mine

Imperial Keystone Coal Co., a new company affiliated with Imperial Coal Corp., has leased a large tract of land at Clymer, Pa., from Clearfield Bituminous Coal Corp. The new firm expects to make an opening to the underground seam and to build a cleaning plant and provide other facilities for a highly mechanized operation. Production is expected to reach 500,000 tons per year and the mine life is estimated at 50 yr. Main offices of the company will be at Johnstown, Pa., and production will be marketed through Imperial's sales offices in New York, Philadelphia and Boston. Officers of the new firm are: Charles A. Owen, board chairman; George E. Owen, president; W. J. Cahill, vice president; J. N. Geyer, treasurer; and H. J. Roberts, secretary.

Moffat Coal Co. Acquires Ten Glen Alden Properties

The Glen Alden Coal Co. has announced completion of arrangements to sell its mining properties in Lackawanna County, Pa., to Moffat Coal Co., Scranton. The sale followed earlier reports that Glen Alden was studying recommendations of an engineering firm looking to concentration of operations (*Coal Age*, May, 1953, p 244). A reported $8,000,000 was involved in the agreement. Under the terms of the sale, Moffat acquires 10 operating properties with reserves to support 35 yr of mining at the rate of 1,500,000 to 2,000,000 tons per year. Francis O. Case, Glen Alden president, said his company's operations now will be concentrated in Luzerne County, with reserves estimated at 150 yr at the rate of 6,000,000 to 7,000,000 tons per year.

And for Your Information . . .

Saxton Coal Corp., Petersburg, Ind., has started development of a new strip mine between Carrier Mills and Stonefort, Ill. A dragline now is reported to be grading for a railroad spur and mining equipment is expected to arrive soon. The operation will employ 25 to 30 men. Most of the production will be sold under a government contract.

David Z. Norton Co., a subsidiary of Oglebay-Norton Co., was reported in mid-June to be opening a new deep mine along Captina Valley, west of Powhatan, Ohio. The 51-ft-deep air shaft, to be lined with steel, already is under construction and the Pennsylvania R. R. is building a railroad spur. Work is expected to start soon on the slope.

Blue Diamond Coal Co. has announced closing of its Mayflower and Bonnie Blue mines near St. Charles, Va. The closings were attributed to exhaustion of the coal. Equipment will be moved to other operations of the company in Tennessee, Virginia and Kentucky.

The Philip Sporn mine at Graham Station, W. Va., will be closed indefinitely because of a rock roll, in which the coal seam disappears into solid rock. Herbert Kammer, president, Central Coal Co., which operates the mine, said the mine may be closed for at least a year. Central Coal Co. is an affiliate of American Gas & Electric Co.

The Suntrana Mining Co., Inc., has purchased the Healy River Coal Corp., one of Alaska's largest enterprises, according to an announcement recently issued by Ken Gillanders, Healy River president. Transfer of properties was expected to take place July 1. The mine is a major coal producer in Alaska. No interruption in service is expected.

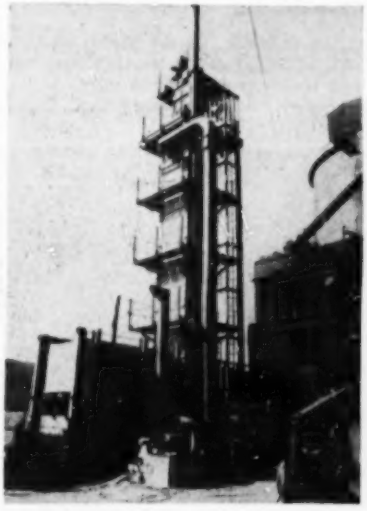
Paul Varga & Sons, Inc., New Philadelphia, Ohio, has opened a new strip mine in the No. 6 seam and loaded the first coal June 17. Preparation equipment includes crusher and screens. Coal will be shipped by B. & O. Ry.

Southern Coal Co. early in June opened a new drift and strip mine in the Sewell seam near Beckley, W. Va. Equipped with shaker screens and picking tables, the mine has a capacity of 1,000 tpd. Coal is shipped by C. & O. Ry.

Jones & Laughlin Steel Corp. has awarded a contract to the Koppers Co. for construction of a battery of 79 chemical-recovery coke ovens to be installed at the Hazlewood plant, Pittsburgh, Pa. Daily carbonization capacity of the new ovens will be 1,925 tons. The new units will replace an old battery of 50 ovens that handled only 850 tpd.

The Crichton Coal & Coke Co., Suburban Station Building, Philadelphia, Pa., successors to the L. C. S. Collieries, Inc., has taken over production at the Virginia No. 14 mine, Heshbon, Indiana County, Pa., and is modernizing and re-equipping the mine to make it one of the largest in Central Pennsylvania.

News Briefs and Trends



Adding Age to Colorado Coal

A NEW PILOT PLANT for making char from Colorado coal recently was completed at the Pueblo steel mill, Colorado Fuel & Iron Co. The plant is a low-temperature furnace using the Petit process to drive off excess volatile matter from high-volatile western coals. The resulting char, when blended with Colorado coking coal, improves the quality of coke for steel mills. In effect, the charring process knocks about 80-million years off the age of Colorado coal and thus makes it similar to eastern coals, C. F. & I. officials explain. The plant handles about 1 ton of coal per hour and turns out some 1,600 lb of char.

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Miners Give Day's Pay To Buddy's Widow

Foregoing the usual miners' tradition of not working the day after a fellow worker dies as a result of a mine accident, the 220 employees of Peters Creek Coal Co., Summersville, W. Va., reported for work July 13 and donated their day's wages to the widow and three small boys surviving a fellow worker. The accident victim died July 12 following a mishap July 9. Company men, invited by the Peters Creek union, UMWA local No. 9253, joined the demonstration of sympathy and gave a day's pay. Mine officials estimated that the widow and her children received about $4,500 in addition to the usual UMWA benefits.

"Sentinels of Safety" Awards Mark 1952 Achievements

Award of "Sentinels of Safety" trophies to winners in six classifications among the 603 coal, metal and other mines and quarries entered in the 28th Annual National Safety Competition for the year 1952 was announced June 30. The contest is conducted by the USBM and the

(*Continued on p. 138*)

Personal Notes

Kidd Named LCN President

GLENN O. KIDD, vice president, Lehigh Navigation Coal Co., was elected July 20 as president of the 130-yr old firm succeeding Evan Evans, who was named chairman of the board. Mr. Kidd has been with the company for 12 yr, working through all phases of the firm's business. He has introduced new selling techniques to the anthracite industry and, less than a year ago, created a stir in the industry by proposing that all anthracite producers unify. Before joining the company in 1941, Mr. Kidd was an attorney for the Interstate Commerce Commission.

William W. Everett, manager of mines, and **John J. Shipherd,** president and director of Delaware, Lackawanna and Western Coal Co., a sales subsidiary, have been elected vice presidents of Glen Alden Coal Co., Wilkes-Barre, Pa. Joining Glen Alden as a laborer in 1923, Mr. Everett advanced through the ranks to become manager of mines in 1952. In his new position, he will direct the production of the company. Mr. Shipherd, who will head the sales of Glen Alden, joined the DL&W company in 1930, and prior to becoming president, served as sales manager for nearly 20 yr.

T. A. Day, chief of the press information section of Bituminous Coal Institute, has resigned to enter the publishing business in a field closely allied to coal. A member of BCI's public relations staff since October, 1947, he was successively employed by Appalachian Coals, Inc., Island Creek Coal Sales Co., and Bituminous Coal Research, Inc., before joining National Coal Association's public relations department.

H. M. Tibbs has been named superintendent of the West Virginia division of the Truax-Traer Coal Co. Mr. Tibbs, who joined the company in February, was formerly associated with The Union Pacific Coal Co. He succeeds **H. M. Cassidy,** resigned.

R. D. Greer has been named assistant superintendent, Power & Mechanical Dept., Inland Steel Co., Wheelwright, Ky.

William F. Hahmann, former deputy administrator of Defense Solid Fuels Administration under Charles W. Connor, resigned, has been named DSFA administrator. **Edwin T. Klett,** also a deputy administrator, will remain with the agency until work on expanded coke-oven capacity, increased metallurgical-coal production and Alaskan coal output is completed.

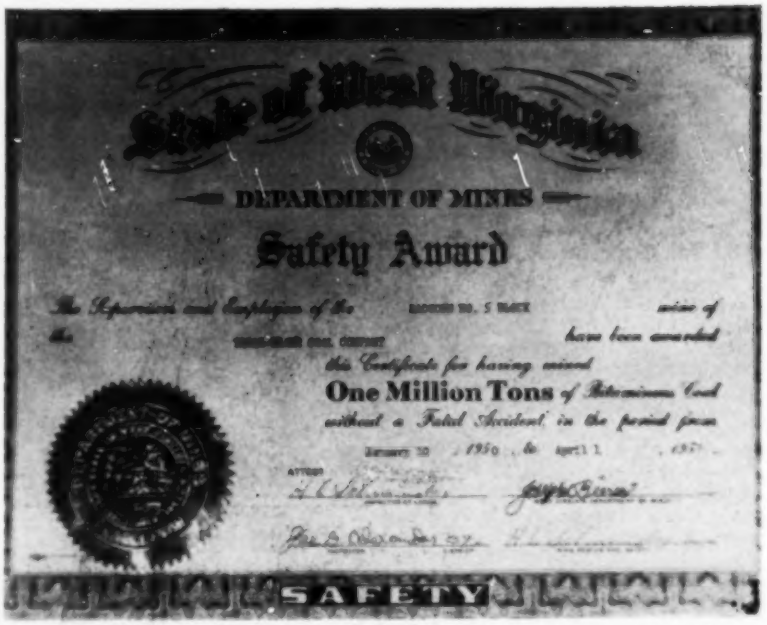
Dick Griffith, superintendent, Mine No. 43, Peabody Coal Co., Harrisburg, Ill., has been promoted to assistant superintendent of the company's Southern Illinois division succeeding Gordon Fuller, who died Feb. 1.

William E. Edmunds, formerly chief engineer, Valley Camp Coal Co., Wheeling, W. Va., has joined the firm of Geo. S. Baton & Co., consulting engineers, Pittsburgh, Pa.

I. S. Gillespie, for the past 3 yr engineer, Stith Coal Co., America, Ala., has been made general superintendent of the company's mines succeeding G. C. Dyar,

Doherty To Island Creek Sales

JOSEPH D. DOHERTY, associated with the U. S. Bureau of Mines synthetic liquid fuels program since Jan., 1945, and acting chief of that program since 1951, has been named consulting engineer of Island Creek Coal Sales Co., Huntington, W. Va. Mr. Doherty will act as advisor to the company and work with metallurgical by-product coke plants and other industries on applications of coal for carbonization, gasification and other conversion processes. He also will supervise a new research program.



Award Cites Record of Raccoon-5-Block Mine

THE WEST VIRGINIA Department of Mines has awarded a certificate to the Raccoon-No. 5 Block mine, Truax-Traer Coal Co., Kayford, W. Va., for mining 1,000,000 tons of coal without a fatal accident. The period covered by the award ran from Jan. 10, 1950, to Apr. 30, 1953, during which time the mine produced 1,037,957 tons. Raccoon-No. 5 Block mine is the third Truax-Traer mine to produce 1,000,000 tons or more without a fatality.

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Drills a 6-inch Hole in two-thirds the ordinary time

Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable level jacks. Automotive steering is optional.

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• This HI-SPEED DRILL is designed for drilling 5 - 6 - 8 inch holes to 100 feet or more. The 40 H. P. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self-starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

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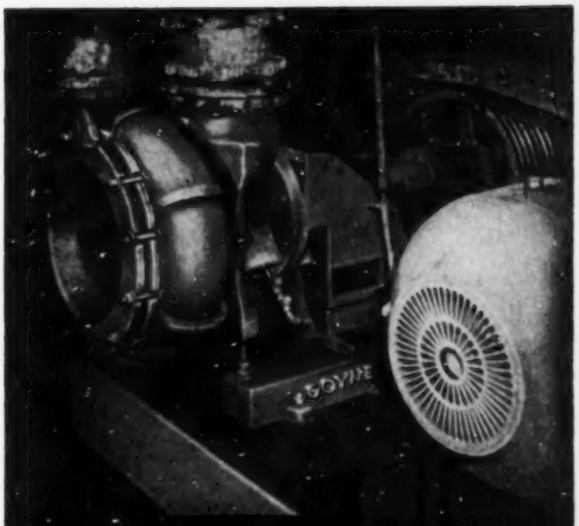

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SOLIDS HANDLING PUMP

Feature: LOW-COST OPERATION

GOYNE SOLIDS HANDLING PUMPS are extremely popular with a very large number of coal companies who find them quite reliable for pumping:

Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

These specially designed Goyne pumps incorporate numerous features to reduce upkeep and labor maintenance costs to a minimum:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing *only the rear head of the pump.* No suction or discharge piping or any other major part of the pump is disturbed.

2. The only packing box of the pump is subjected to the low suction pressure rather than to the discharge pressure developed by the pump. This feature assures long packing and shaft sleeve life.

3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyne Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.

GOYNE MINE PUMPS 1888

The GOYNE STEAM PUMP CO.
ASHLAND, PA.

CONVERTED GOODMAN 460 or 360 LOADER
CONVERTED GOODMAN 324 CUTTER
CONVERTED JEFFREY 29U CUTTER
for Economy...
CONVERT NOW from TRACK to TRACKLESS
"TRACKLESS MINING" with conventional cutters, loaders and shuttle cars provides the most economical and efficient mining system available today.
These trackless advantages are yours by having your track-mounted cutters and loaders converted to trackless operation - Lee-Norse "conversions" that result in greater savings to you through . . .
• Lower investment compared with new mining machines.
• Very little increase in spare parts inventory.
• Converted machines are well-known to your operators and maintenance men - no need for re-education.
• Lost time for conversions minimized.
• Obsolescence losses due to possible new continuous miner developments are held to a minimum.
Lee-Norse Company
Specialists in Coal Mining Equipment
CHARLEROI, PA.
Write today for complete facts on converting your track mounted equipment.

who resigned last January. Mr. Gillespie has held executive positions in the Warrior and Cahaba coal fields for 20 yr.

George M. Thursby has been designated vice president—industrial relations administration, U. S. Steel Corp. He moves into his new position after serving since 1951 as vice president—industrial relations administration for coal. Mr. Thursby began his career with U. S. Steel in 1921. He was made director of industrial relations for H. C. Frick Coke Co. in 1944 and became a vice president —industrial relations for Frick and associated coal companies in 1947.

"Jimmy" Walsh, fireboss, and **"Billy" Simpson,** section foreman, have retired after a total of 105 years with The Hudson Coal Co., Scranton, Pa. Mr. Walsh has been with the company for 60 yr and an official for 40 yr; Mr. Simpson, for 45 yr, during 30 yr of which he was an official. Also, **Henry ("Hank") Burnell** has retired after 50 yr of service in Hudson's mining engineering department.

Howard R. Batcheldor, for 5 yr in charge of gasification planning at the USBM synthetic fuels demonstration plant, Louisiana, Mo., has joined the staff of Battelle Memorial Institute, Columbus, Ohio. He will coordinate research devoted to non-fuel uses of coal and chemicals derived from coal.

Appointment of **James H. Cunningham** to the post of assistant director, Bituminous Coal Institute, was announced July 13 by Ralph C. Mulligan, BCI director of public relations. Mr. Cunningham joined BCI in 1948 as assistant director of the educational department and director of the Speakers' Bureau. He has been administrative assistant to Mr. Mulligan since early in 1951.

Obituaries

E. W. Holt, 77, prominent coal operator of Central City, Ky., died June 29 in Petowskey, Mich., where he was vacationing. With his brother, the late Ben B. Holt, Mr. Holt started operations in Muhlenberg County in 1903 and in 1920 opened the Holt Bros. Mining Co. at McHenry, Ky.

Joseph Cunningham, 71, retired president, Crummies Creek Coal Co., died June 29 in a Cincinnati, Ohio, hospital after an illness of several years. Before his retirement in 1950, he served as president and director of the Harlan County Coal Operators' Association, was active in the formation of Appalachian Coals, Inc., and served as a director of National Coal Association and Southern Coal Producers' Association.

Osborne S. Morgan, recently retired mining and consulting engineer for the Pennsylvania Department of Mines, died June 30 at his home in Wilkes-Barre, Pa.,

(*Continued on p. 138*)

We thought we'd catch your eye and give it a break at the same time!

Most of you mining and quarry men undoubtedly follow, as we do, all of the top magazines in the field. You have to, in your business. We have to, in ours. And if you're anything like us you've probably gotten tired of seeing the same sort of pictures, page after page.

SO WE THOUGHT WE'D CATCH YOUR EYE, AND GIVE IT A BREAK AT THE SAME TIME by not showing any picture at all! As for selling you, we feel we can rely on the acceptance and popularity the great Cities Service name enjoys throughout the industry. ACCEPTANCE because our industrial oils and greases are as good as the best in every case, better in most! POPULAR because Cities Service Engineers have gone out of their way, time and time again, to help solve tough lubricating problems successfully in hundreds of mining and quarry operations.

If you have a tough problem on your hands, call in our Lubrication Engineer for help . . . and take advantage of the tremendous research staff and laboratory facilities that back up every Cities Service Lubrication Engineer. Simply call or write your nearest Cities Service Office, or write Cities Service Oil Co., Dept. H-5, Sixty Wall Tower, New York 5, New York.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

SAFETY—V. O. Murray (left); Lyman Fearn, Wyoming Dept. of Mines; John A. Garcia, New Mexico Dept. of Mines; Leonard Ford, CF&I; A. C. Moschetti, USBM; Kirk V. Cammack, USGS; Joel N. Van Sant, St. Louis, Rocky Mtn. & Pacific Coal Co.; Emery Olsen, U. S. Steel Corp.; F. J. Peternell, Union Pacific; and J. J. Roddy, Colorado Dept. of Mines—all discussed safety questions submitted by institute members.

Mining methods, coal's problems and opportunities, and safety major themes at . . .

49th Rocky Mountain Meeting

Highlights:

Tungsten-carbide tools
Backfilling large openings
Coal and Congress
Bolting and safety
Shuttle cars and cables
Trends and progress

CURRENT AND FUTURE TRENDS in the coal industry of the nation and the West, new approaches to the solution of operating problems, coal's relations with Congress, and safety were major themes of the 49th annual meeting of the Rocky Mountain Coal Mining Institute at Glenwood Springs, Colo., June 28-July 1. Also, a record number of registrants, over 180, heard members adopt resolutions supporting the imposition of limit quotas on residual-oil imports, opposing the entry of Canadian natural gas into the Northwest, commending the Public Power Commission in ruling that the Union Light & Power Co., St. Louis, Mo., continue to use easily obtained and closely adjacent high-quality steam coal instead of natural gas, deploring the bungling which culminated in failure to secure confirmation of a proposed candidate for the office of Director, U. S. Bureau of Mines, and commending the attitude and performance of J. J. Forbes during his tenure as director of the Bureau of Mines. The resolutions committee included Burt B. Brewster, publisher, *Mining and Contracting Review* Salt Lake City, Utah; A. B. Foulger, vice president and general manager, Lio Coal Corp., Ogden, Utah; and R. L. Hair, general superintendent—fuel mines, Colorado Fuel & Iron Corp., Pueblo, Colo.

TOOLS AND METHODS

At the lead-off session on Monday morning, speakers and their subjects were: A. F. Dobbrodt, manager of mining sales, Carboloy Dept., General Electric Co., Detroit, Mich., on "Tungsten-Carbides and Their Application in Mining," and John Peperakis, assistant manager of mines, Kaiser Steel Corp., Sunnyside, Utah, on "Backfilling to Stabilize Large Openings." Session chairman was V. O. Murray, vice president—operations, Union Pacific Coal Co., Rock Springs, Wyo., and retiring institute president.

In formally opening the series of meetings, Mr. Murray remarked that no one in the coal industry needs to be told business is shrinking. Competition from other fuels along with the fact that investment in mechanical mining has not materially reduced the cost of labor in the past 20 yr has put coal in a bad plight. More basic research is necessary, Mr. Murray said, so that coal may stage a comeback through more widespread application of its by-products. The West has plenty of coal, and the industry's job is to make it cheaper and easier to use, Mr. Murray concluded.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

There are basic similarities between metalworking and coal mining, Mr. Dobbrodt said, in emphasizing that the metalworking industries recognized the problems of tool wear and process economy and took steps to arrive at a solution. Development of tungsten-carbide tools was the result. More information on the characteristics of various coals and the cutting job to be done may result in similar benefits for coal.

After recounting the history of tungsten-carbide development back to the early 19th century and presenting a list of properties, Mr. Dobbrodt told some of its modern uses, as in precision gages, metal-stamping dies, bearings and cutting tools.

Furthermore, tungsten-carbide tools can be tailor-made to suit the job at hand. Mr. Dobbrodt said, in pointing out that about 20 different grades now are manufactured.

In the 50 largest mines in the Nation, accounting for close to 70 million tons per yr, approximately 80% of the underground production is mined with carbide-tipped tools, Mr. Dobbrodt declared. In practically every one of these mines, production has increased as a result of decreased down-time for the cutting equipment.

In the discussion, Mr. Dobbrodt said that bit hardness can be increased by

BACKFILLING, TUNGSTEN CARBIDES—V. O. Murray (left), Union Pacific Coal Co., session chairman and institute president; John Peperakis, Kaiser Steel Corp.; and A. F. Dobbrodt, Carboloy Dept., General Electric Co.

LEGISLATION, SHUTTLE-CAR PROBLEMS—Robert E. Lee Hall (left), National Coal Association; A. B. Foulger, Lion Coal Corp.; F. J. Peternell, Union Pacific Coal Co.; and C. B. Peck Jr., Anaconda Wire & Cable Co.

reducing the cobalt content, but then the strength of the material is reduced. Also, modern brazes and mechanical holds of improved design may solve the problem of knocking out inserts when cutting chains are reversed.

In a paper jointly authored with T. R. McCourt, mine superintendent, Sunnyside No. 2 mine, Kaiser Steel Corp., Mr. Peperakis described his company's practice of only partially cleaning up high caves in aircourses, thus permitting the remaining backfill material to bulwark the coal ribs against dangerous sloughing. Previous mining practices and the prevailing conditions (high coal, poor top, deep cover) at Sunnyside had led to squeezes and the attendant sloughing if caves were completely cleaned up.

The job is done in caved entries by loading out enough of the loose caved rock to provide from 8 to 9 ft clearance over the top of the cave, leaving the remainder of the rock as fill, Mr. Peperakis explained. The roof and loose ribs are bolted as the face advances, and large slabs on the approaches to the caves are shot and the surface smoothed out to make a good travelway. The rock loaded out from the top of the cave is used in non-caved sections of the entry where the height is too great to give secure ribs.

Among the advantages of the new method are:

1. Preventing deterioration of weak pillars.
2. Establishing safer travelways.
3. Streamlining airways, thus eliminating the shock losses which would occur in entries having abrupt changes in cross-sectional area.
4. Keeping entries safer with less maintenance such as retimbering and cribbing.
5. Substantially reducing the quantity of rock that must be hauled from the mine. Similar backfilling and bolting in the main underground slope at Sunnyside has provided a better grade and longer life for this hoistway which must be used in bringing to the surface the projected increased production at the mine. Diagrams of these backfilling methods appear in the May, 1953, issue of *Coal Age*, p 117.

Monday-afternoon speakers and their subjects were: Robert E. Lee Hall, counsel, National Coal Association, Washington, D. C., on "Coal and Congress"; C. B. Peck Jr., manager of sales, Insulated Wire Products Div., Anaconda Wire & Cable Co., New York, on "Shuttle-Car Cable Problems," and F. J. Peternell, safety engineer, Union Pacific Coal Co., Rock Springs, Wyo., reading a paper prepared by R. F. Bowie, planning engineer, Union Pacific Coal Co., on "The Use of Tractor-Tread Shuttle Cars in Steeply Pitching Seams." Mr. Foulger presided.

Speaking as a director of the National Coal Association, Mr. Foulger, before presenting the speakers, urged western operators to take a more active part in financially supporting the association in its several functions.

ROOF-BOLTING, MINE COLLAPSE—J. H. Emrick (left), Joy Mfg. Co.; C. M. McConnell, U. S. Geological Survey; Fred W. Whiteside, consulting engineer and institute secretary, and F. S. Leonard, chief coal-mine inspector, CF&I.

COAL AND CONGRESS

There is a tremendous load of legislation in the Congressional hopper, Mr. Hall said, and all of it must be scrutinized for its possible effect on the coal industry. As an instance of a job well done for coal, with regard to legislation, Mr. Hall mentioned the history of percentage-depletion tax adjustment. One lesson learned in this fight, Mr. Hall declared, was the value of legislation by

(Continued on p 176)

Fastest coal fueling facility on the Great Lakes: North Western-Hanna's 800-tons-per-hour bunkering plant, efficiency stepped up by engineered conveyor drive incorporating Model 17.5 HCB and Model 17.5 HC-BR Twin Disc Hydraulic Couplings. For data on complete coupling line (up to 700 hp capacity), ask for Bulletin 144-C.

Motors working through straight mechanical drives often have too tough a job to perform. Every start, every load variation presents a sudden, jarring demand for power. Motors overheat, drives are damaged, need frequent replacement—downtime is a constant headache.

North Western-Hanna Fuel Company of Superior, Wisconsin licked this problem on the big conveyor at their Lime Island coal bunkering station (above)—with Twin Disc Double-Circuit Hydraulic Couplings, *job-engineered* between motors and Link Belt drives. Today, the big conveyor starts *smoothly*, picks up sudden load variations *easily*, through the vitally needed *soft touch* of Twin Disc's Double Circuit Hydraulic Drive.

For 35 years, since World War I, both manufacturers and users of industrial drives have depended on Twin Disc to improve performance, protect driving and driven equipment. For assistance or information on use of friction or hydraulic drives, contact the nearest Twin Disc Factory Branch or write direct to the Factory.

Built for a Long Life . . .
Backed for a Lifetime

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CLUTCHES AND HYDRAULIC DRIVES

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BRANCHES: CLEVELAND · DALLAS · DETROIT · LOS ANGELES · NEWARK · NEW ORLEANS · SEATTLE · TULSA

after an extended illness. Associated with the coal mining industry for more than 50 yr, Mr. Morgan, prior to his latest position, served as a state mine inspector for a number of years.

Dow Quillen, 52, mine foreman, The South-East Coal Co., Seco, Ky., died June 20 at the Seco hospital after a long illness. Mr. Quillen had been with the company for several years.

Andrew John Burns, 60, Elbert, W. Va., chief mine inspector, U. S. Coal & Coke Co., died July 9 in a hospital at Welch.

Clyde Vester Bennett, 67, president and general manager, V.&C. Coal Co., Gray's Knob, Harlan County, Ky., and a past president, Harlan County Coal Operators' Association, died suddenly at his home July 14. Mr. Bennett also was associated with his son, H. M. Bennett, in the Dartmond Coal Co.

News Briefs Continued

bronze trophies retained by the winners for 1 yr are donated by the *Explosives Engineer* magazine. Trophy winners in coal mining are:

Underground Anthracite Mines—Hunter Tunnel mine, Philadelphia & Reading Coal & Iron Co., Ashland, Schuylkill County, Pa. Employees worked 77,336 man-hours without a lost-time injury.

Underground Bituminous Mines—Short Creek mine, Tennessee Coal & Iron Div., U. S. Steel Co., Adamsville, Jefferson County, Ala. Employees worked 588,788 man-hours without a lost-time injury.

Other achievements in the 1952 competition included a new low injury-frequency rate for competing underground anthracite mines and record low frequency and severity rates for competing underground bituminous mines, showing that the competing mines and quarries had safety records much better than that of the industry as a whole.

Certificates of Achievement in Safety for non-injury records or for placing second to fifth in their classifications went to the following coal mines:

Anthracite—Pittston mine, P. & J. Coal Co., Pittston, Pa.; Gravity Slope mine, The Hudson Coal Co., Archbald, Pa.; No. 11 Slope mine, Kehoe-Berge Coal Co., Exeter, Pa.; Coal Brook mine, The Hudson Coal Co., Carbondale, Pa.

Bituminous—Crested Butte mine, The Colorado Fuel & Iron Corp.; Crested Butte, Colo.; Karen mine, U. S. Steel Co., Fredericktown, Pa.; Freeport mine, Pond Creek Colliery, Norfolk & Western Ry. Co., Williamson, W. Va.; Thacker mine, Pond Creek Colliery, Norfolk & Western Ry. Co., Williamson, W. Va.; No. 3 Seam Stansbury mine, The Union Pacific Coal Co., Stansbury, Wyo.; Reliance No. 7 mine, The Union Pacific Coal Co., Reliance, Wyo.

(More News on p 142)

You can tell by the **PERFORMANCE . .**

sure they're **Eucs!**

Wherever they're put to work, "Eucs" do the kind of a job that makes them the preferred equipment for moving earth, ore, rock and coal in off-the-highway service.

Big payloads, fast travel speeds and high job availability add up to more loads per hour and more profit per load. Whatever the job . . . building highways, dams, levees, airports . . . working in mines, quarries or on industrial projects, you can depend on "Eucs" for low cost hauling.

If you own "Eucs" you're already benefiting from their production and profit advantages. If you know them only by reputation, we suggest you get performance facts and figures from your Euclid distributor.

Euclid Scraper—15.5 cu. yds. struck, 21 cu. yds. heaped at 1:1 slope . . . 275 h.p. engine . . . top speed, loaded, 28.2 m.p.h.

Bottom-Dump Euclids—13 to 25 cu. yds. . . . . 190 to 300 h.p. . . . top speeds loaded to 34.4 m.p.h.

Rear-Dump "Eucs"—10 to 34 tons . . . 125 to 400 h.p. . . . spring mounted or semi-rigid drive axles . . . top speeds loaded to 36.3 m.p.h.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

NEW SOCIETY HEAD—R. Charlick, new president of the Mining Society of Nova Scotia, is led to the chair by past President E. J. Flynn. Mr. Charlick succeeds John A. Russell, shown with Sydney C. Mifflen (right), re-elected to his 25th term as secretary-treasurer.

RYAN TROPHIES—Participants in the award of the national and regional John T. Ryan safety trophies for the second year in succession to the No. 18 colliery, Dominion Coal Co., Ltd., include E. D. Brown (left rear), society vice president; R. Charlick, society president; Prof. E. J. Flynn, who made the presentation; R. Morris, vice president, Mine Safety Appliances Co. of Canada, Ltd; M. Boyer, deputy minister of mines for Canada; Daniel Murray, colliery manager, who received the awards; and R. M. McColl, Mine Safety Appliances of Canada.

MINING, FIRE FIGHTING — Louis Frost (left), Dominion Coal Co., Ltd., and M. G. Goudge, mining engineer, Nova Scotia Department of Mines.

COAL WASHING, SAFETY—D. Murray (left), manager, No. 18 colliery, and J. E. Terry, engineering department, Dominion Coal Co., Ltd.

COAL CONVERSION, ROPE TESTING—R. Simpson (left), Nova Scotia Department of Mines, and Dr. H. H. Storch, U. S. Bureau of Mines.

Nova Scotia Society Canvasses Mining, Safety and Utilization

COAL AND METAL MINING, safety and coal utilization were the themes of the 66th annual meeting of the Mining Society of Nova Scotia, held at the Isle Royale Hotel, Sydney, N. S., July 2-4, with one session devoted to a motion picture of steel production and fabrication at plants of the Dominion Steel & Coal Co., Ltd., and subsidiaries. In its business session, the society inducted new officers, as follows:

President—Reginald Charlick, general manager, Victoria Gypsum Co., Ltd., Little Narrows, N. S., succeeding John A. Russell, mechanical engineer, Dominion Coal Co., Ltd., Sydney.

Vice presidents—Frank Doxey, assistant general manager, Dominion Coal Co., Ltd., Sydney, and E. D. Brown, vice president, National Gypsum (Canada), Ltd., Dingwall, N. S.

Secretary-treasurer—Sydney C. Mifflen, technical assistant to the general manager, Dominion Coal Co., Ltd., Sydney, re-elected to his 25th consecutive term.

Speaker at the annual banquet was M. Boyer, Deputy Minister of Mines for Canada, who discussed the role of minerals in modern society and the problems involved in utilizing new materials and forms of energy.

Luncheon sessions on July 2 and 3 were devoted to honoring outstanding students and to marking the winning of the national and regional John T. Ryan safety trophies by the No. 18 colliery of the Dominion Coal Co., Ltd., for the second consecutive time. The occasion also marked the tenth time out of eleven that the national award has gone to Dosco collieries, which also have won all eleven regional trophies. The presentation was made by Prof. E. J. Flynn, Nova Scotia Technical College, Halifax, N. S., past president of the society and president, Canadian Institute of Mining and Metallurgy. The trophies were received for the colliery by Daniel Murray, manager.

Winners of the student awards, presented by Alex H. MacKinnon, Nova Scotia Minister of Mines, were:

Kenneth R. Warren, Springhill, N. S., society scholarship to Nova Scotia Technical College.

C. A. MacDonald, New Waterford, N. S., overman at No. 12 colliery, Dominion Coal Co., Ltd., highest grade in the 1953 examinations for certificates of competency as underground manager. Mr. MacDonald also won the award for overmen in 1952.

Blaise W. Campbell, Victoria Mines, N. S., now employed by the Greenwood Coal Co., Ltd., Thorburn, N. S., highest grade in the examination for overmen.

H. E. Oliver, Stellarton, N. S., also with Greenwood, highest grade in the examination for mine managers.

Prizes to members of the society's student chapters were awarded to:

Douglas H. Loring, Wolfville, N. S., Acadia University.

Cyril J. Hadley, Guysborough, N. S., St. Francis Xavier University.

MAINTENANCE IN MINING

Coal mining has gone heavily into the use of machines, both to cut cost and reduce the physical burden on employees, said Mr. Russell in his official address preceding the induction of the new president. Machines are necessary to keep costs in line, and frequently the very life of the mine is dependent upon the installation and proper use of machines. Thus, machines are vital and consequently must be kept in the best possible condition at all times. This means that mechanical maintenance, and especially preventive maintenance, must be made a first-line rather than a secondary operation. The needs today are for:

1. Trained men provided with the proper tools.

2. Systematic procedure and provision for ample time to inspect, repair and overhaul.

3. A goal based on prevention of machine outages rather than repair after breakdowns.

All this, Mr. Russell concluded, demands new thinking all the way. The job can be done. Until it is done, the full benefits of mechanical mining cannot be attained.

NOVA SCOTIA MINING

Reviewing mining activities in Nova Scotia, M. G. Goudge, mining engineer, Nova Scotia Department of Mines, Halifax, noted that coal production dropped off slightly in 1952, largely as a result of fires and explosions. Exploration of coal horizons to depths over 2,700 ft by diamond drilling is being carried to completion and developments in coal research include a decision to erect a pilot plant for further investigation of the possibilities of low-temperature carbonization as a source of lump domestic fuel.

NO. 16 FIRE

A fire resulting from a brushing shot and subsequent ignition of gas turned out to be a difficult one to extinguish and forced either partial or complete closing of the No. 16 colliery of the Dominion Coal Co., Ltd., New Waterford, N. S., for a lengthy period to permit extinguishment by sealing. In describing the outbreak of the fire and the measures taken to cope with it, Louis Frost, chief mining engineer for the company, pointed out that it started Oct 6, 1952, and was finally declared out Jan. 4, 1953.

It was thought that the fire had been extinguished the first day but it continued to break out, apparently as a result of the continuation of flame in gas in cracks in the roof which was pushed out by sudden increases in pressure, in spite of the application of water through diamond-drill holes to cool the overlying strata. Consequently, on Oct. 8, it was decided to seal the area with stoppings of rock dust in bags 6 ft thick supplemented by 12-in sand seals behind double-ply thicknesses of plank. The outbursts of flame were fought during the sealing period by carbon dioxide taken into the area in cylinders and fed out through manifolds to permit cylinder replacement without interrupting the supply.

Sealing was completed on Oct. 10. An inspection was made Oct. 12, which disclosed that one seal had been blown out by an explosion. None of the others had been affected. The seal was rebuilt and all were tightened by grouting around them. Methane buildup then occurred, with reduction in oxygen, with the exception of the area behind one seal, where a buildup in carbon-dioxide resulted in a decision to keep the east side of the colliery closed down.

In spite of the grouting, considerable breathing through the stoppings occurred. Therefore, to speed the buildup of the inert atmosphere, secondary plywood stoppings were built at all but one seal and fans were installed to exert a negative pressure and thus reduce leakage of methane out of the remaining stopping and pull the inert blanket downhill from that stopping, which also was equipped with a secondary stopping and a positive-pressure fan. By Dec. 26, gas samples showed that the fire was definitely out, and removal of the stoppings was begun on Jan. 3. Subsequent inspection prior to reopening the section indicated that the explosion in the early days of the fire might have put the fire out then, said Mr. Frost, though there was no way of making sure at that time.

The skill shown in fighting the fire by both men and officials was especially noted in discussion by H. C. M. Gordon, Dominion vice president and general manager, and Mr. Doxey. Both also cited the important role of carbon dioxide in keeping the situation under control while sealing was going on, and expressed their thanks to the many outside industries that had made cylinders available from their supplies. Mr. Gordon especially noted that inability to get at the pilot flame or flames up in the cracks had necessitated cessation of operations and sealing.

SYDNEY MINES WASHERY

Designed to wash, size and otherwise prepare coal from the Princess and Florence collieries, the new Sydney Mines preparation plant of the Dominion Coal Co., Ltd., is considered a pilot installation that will go far toward making Nova Scotia coal the most wanted in the solid-fuels market, said J. E. Terry, field engineer, Dominion mechanical-engineering department. Mr. Terry discussed construction details and erection, which

(*Continued on p. 162*)

A single answer to 4 mining problems

All four of these mining problems were economically solved with Armco Liner Plates. On a pound for pound basis these plates cut costs while improving safety and efficiency.

Costs are lower because of easy installation. Corrugated metal design of Armco Liner Plates provides safe strength with less weight and material. This means that one man can carry, hold and bolt an Armco Liner Section into place. Tightening bolts with a structural wrench is done inside the structure. Work goes on smoothly, quickly with unskilled labor.

Other advantages you will like include fire-resistance and freedom from excessive maintenance.

With the wide range of diameters and gages available, you can find the right size of Armco Liner Plates to meet your particular mining needs. Write for details. Armco Drainage & Metal Products, Inc., 2133 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

Armco Liner Plates

ARMCO

Mine Entries

Bins

Overcasts

Shafts

Giant Rig Gobbles Overburden

AUSTRALIAN ENGINEERS are building two giant overburden dredges for use at the big brown-coal stripping near Morwell, Victoria, which is said to be the world's largest brown-coal deposit. The coal will be processed in briquet plants to supply the State Electricity Commission.

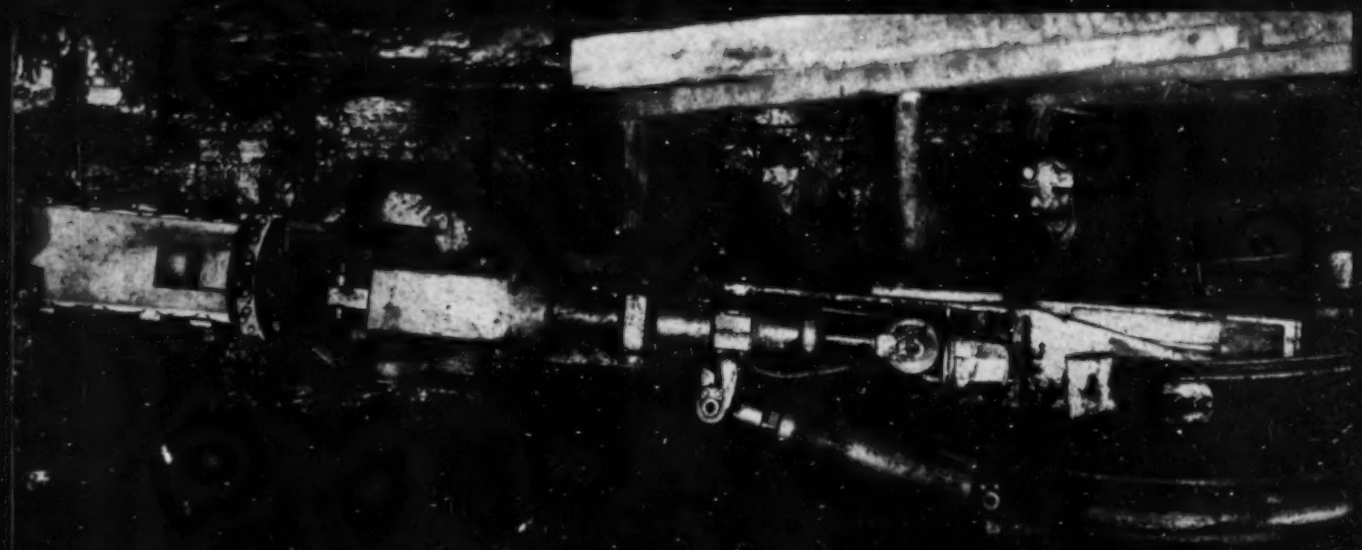
The dredges, of the bucket-chain type, are based on designs captured in Germany after World War II. The overburden machine (above) will have a capacity of 700 cu yd per hour, stand 84 ft high and weigh about 690 tons. It will excavate to a height 49 ft above its operating level and to a depth 46 ft below. The chain will comprise 26 buckets, each with about 1 cu yd capacity. The dredge will move on tracks under its own power. Four men will make up the operating crew.

Pine No. 1 Wins First-Aid Meet

A score of 99.8% won first-place honors for the first-aid team from Pine No. 1 mine, Pine Township Coal Co., Heilwood, Pa., at the North Central Pennsylvania contest at Indiana, Pa., July 18. Members of the team, which was awarded $350 and the Mine Safety Appliances Co. plaque, are: Steve Stupic, Jr., captain; Michael Buriok, Michael Kuzemchak, John Compardo, Stephen A. Popovich, Joseph Leone and George Slonac. Second place was won by the team representing Kent Nos. 8 and 9 mines, Rochester & Pittsburgh Coal Co., McIntyre, Pa., headed by Hugh Ruddock, captain, and third place by the team representing No. 5 mine, Pennsylvania Electric Co., Seward, Pa., under John J. Kruk, captain.

UMWA Withdraws E. Ky. Suit

The UMWA has withdrawn its $2,000,000 suit against coal operators in Clay and Leslie Counties, Ky. The action came June 29, when Judge H. C. Ford granted a dismissal requested by UMWA attorneys. The union had charged more than 140 operators with a reign of terror aimed at blocking a union organization drive. The original suit was filed in Sep-



Nothing on the Market Matches

JOY SULMET CUTTER BITS

WHEN IT COMES TO CONQUERING TOUGH SEAM CONDITIONS

JOY Sulmet Tungsten Carbide Cutter Bits can cut faster and at less cost per ton of coal than any other bit on the market—*facts proved by actual operating records from many different mining areas and under widely varying seam conditions.* An exclusive Joy feature—the use of a protective cap over the tungsten carbide insert—reduces bit breakage and practically ends insert loss. Sulmet Bits are available in eight cutter styles, including a design for the Bowdil ML Chain, plus auger and finger bits for Coal Drills. ● *Let us show you what they can do for you.*

See the Joy Film: "Sulmet Tungsten Carbide Bits" 16 mm · Sound · Full Color · 40 Minutes
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AGAIN SULMET BITS PROVE SUPERIOR

THE PROBLEM: A Western Pennsylvania mine has sulphur streaks, 1″ to 6″ thick, running throughout the seam. Hard clay veins occasionally obliterate the coal for two or three cuts. Both an undercut and shear cut were used, and shearing through these impurities caused so much wear that cutting time per shift was greatly reduced by frequent bit changing.

THE SOLUTION: A test run was made on their Universal machine with 125 Sulmet SMB Bits (see above). After four weeks of operation, three shifts a day, the test was considered complete, although 89 bits still had a life expectancy of two or three weeks. Even if all were considered worn out, bit cost would be only $.026 per ton of coal. Also, cutting speed had increased tremendously since all bit-changing could be handled between shifts.

Consult a Joy Engineer

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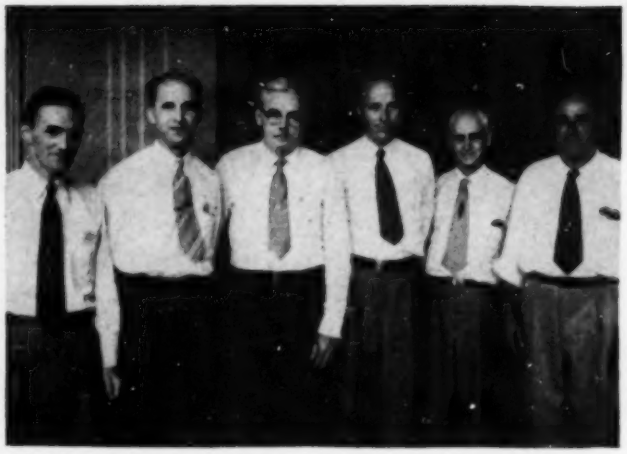
BRUSHES, CABLES, CONTROLS—W. Siebenmorgen (left), consultant, Speer Carbon Co., Westwood, N. J.; L. E. Blanchett, electrical engineer, Bucyrus-Erie Co., S. Milwaukee, Wis.; R. A. Nelson, test engineer, and H. R. Stoddart, district engineer, Simplex Wire & Cable Co., Chicago, Ill.



GERMAN STRIPPING, FEDERAL INSPECTION, VIBRATION—E. G. Fischer, Westinghouse Electric; C. M. Dovidas, Bureau of Mines; James Hyslop, Hanna Coal Co., meeting moderator; John Huey and J. C. Rettenmayer, United Electric Coal Cos.; and C. E. Crawford, Midland Electric Coal Corp., retiring president. Frank Bohann, The M. A. Hanna Co., Hibbing, Minn., is president-elect.

Open-Pit Electrical Division Meets

HOW TO GET THE MOST out of carbon brushes, how to insure greater safety with high-voltage cables, what rotating controls are and what they do, how the wheel excavator is used in German stripping, what federal inspectors look for at strip mines, and the effects of vibrations on stripping equipment were major topics at the 9th annual meeting of the electrical division of the Open-Pit Mining Association, Rose Polytechnic Institute, Terre Haute, Ind., July 17.

More than 130 members in attendance also elected officers for the coming year as follows: president, Frank Bohann, electrical engineer, The M. A. Hanna Co., Hibbing, Minn.; vice president, Edward Gaston, electrical engineer, Hanna Coal Co., St. Clairsville, Ohio; Secretary-treasurer, L. E. Briscoe, electrical engineer, Ayrshire Collieries Corp., Indianapolis, Ind., who was re-elected. In his annual report, Mr. Briscoe pointed out that membership is steadily increasing and invited electrical officials of all coal companies and electrical manufacturing companies to consider joining the group for mutual benefits.

Speakers and their subjects at the opening session were: William Siebenmorgen, consultant, Speer Carbon Co., Westwood, N. J. "The Carbon Brush Always Gets the Blame"; H. R. Stoddart, district engineer, Simplex Wire & Cable Co., Chicago, Ill., "Phenomena Involved in Shielded Cables Operating at Higher Voltage Levels"; and L. E. Blanchett, electrical engineer, Bucyrus-Erie Co., S. Milwaukee, Wis., "Amplidyne and Rototrol — Operation and Maintenance Problems." R. A. Nelson, test engineer, Simplex Wire & Cable Co., Chicago, followed Mr. Stoddart's presentation with a demonstration of condenser effect in non-shielded cables and how properly-made stress-relief cones at cable terminations contribute to better cable performance by materially reducing corona.

The conferees were welcomed to the Rose Tech campus by Professor Herman A. Moench, head of the department of electrical engineering. James Hyslop, president, Hanna Coal Co., St. Clairsville, presided at both morning and afternoon sessions.

USING CARBON BRUSHES

It is natural to find fault with carbon brushes since these parts most often provide the only visual sign of trouble in rotating equipment, Mr. Siebenmorgen declared, in pointing out that sparking and heating at the brushes may be only the symptoms of the real trouble. Furthermore, brushes must be carefully specified for particular applications if best possible operation is to be realized, since the duty is so demanding. For example, brushes running on a 24-in commutator may travel as much as 25,000 mi per month while operating 10 hr per day and impulses through the brush may occur at a frequency of 1,000 per sec. For these reasons, brushes should be designed to low-friction, low-inertia and non-abrasive characteristics. In addition, brushes should present a high contact drop to limit the reactance voltage, which causes sparking in some instances.

Good shunts and properly-designed brush holders also are necessary to get desirable commutation and longest life out of the brushes, Mr. Siebenmorgen said, in describing how improper tilting in the holders makes for reduced contact area and rapid wear on one side of the carbon block. On commutators, Mr. Siebenmorgen pointed out the advantages of arch-bound segments over the V-ring type, inasmuch as the former can be more securely tightened. And turning and stoning of commutators are of little help if the commutator segments are loose.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

BENEFITS OF SHIELDED CABLE

Although non-shielded cables are being used in 4,160/2,300-v applications, Mr. Stoddart said, it is much more desirable from a safety standpoint to use cable with a properly-grounded metallic shield. Since cable sheath is constantly under the influence of electrostatic and magnetic fields when the power is on, it is possible for a non-shielded cable or an ungrounded shielded cable to act as a condenser, Mr. Stoddart explained. In wet, dirty conditions it might be possible for this condenser to discharge through a man's body with fatal results. A demonstration was presented by Mr. Stoddart showing the current which may be taken from the sheath of a wet cable carrying high voltage—a current of sufficient magnitude to cause serious injury.

The best solution, Mr. Stoddart pointed out, is to employ only shielded cable and to be certain that the shield is grounded. "You will know where charging currents and dynamic currents in cable sheath are going if you provide a safe path for them," Mr. Stoddart concluded.

In a following demonstration, Mr. Nelson showed how properly-made

(*Continued on p. 158*)

the bits of The Bowdil Company are sold and known in the trade by the following registered trademarks

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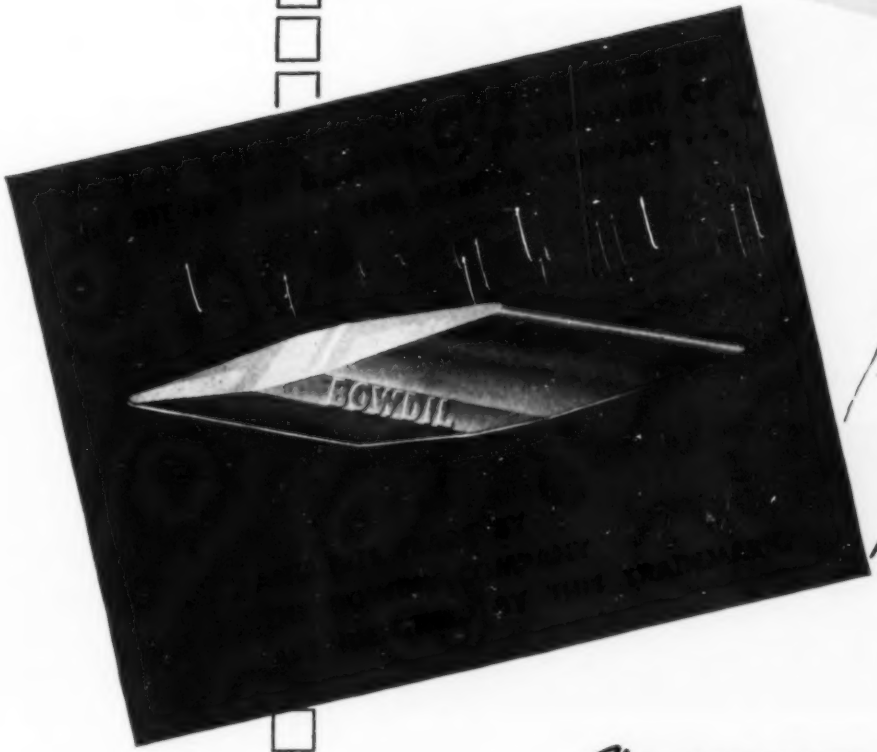

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FIRST-PLACE WINNERS — Team from Truax-Traer Coal Co., Kayford, W. Va.: standing, W. R. Perfater (left), safety inspector and instructor, Tommy Jones; Raymond Carroll; E. M. Cassidy, general manager; B. R. Wentz; Hobart Skaggs; W. R. Carr; kneeling, H. L. Stricklin; J. J. Mulhall, safety engineer; and R. E. Carr.

ALSO FIRST-PLACE WINNERS — Team from Carbon Fuel Co., Carbon, W. Va.: standing, H. A. Jones (left), general superintendent; Robert Haley; Harry Carter; Dave Geiger; James Singleton; Kenneth Moore; kneeling, Thomas D. Hale and Wilbert Williams.

SECOND PLACE—Team from Carbon Fuel Co.: standing, H. A. Jones (left), general superintendent; Tony DeRaimo; Charles Hossler; J. S. Crowder; Louie DeRaimo; kneeling, Hubert Higginbotham, Skippy Williams and Tony Billanti.

FIRST PLACE, BOYS' DIVISION — Team from Semet-Solvay Div., Allied Chemical & Dye Corp., Longacre, W. Va.: Paul Coleman (left), Donnie Thomas, Ronald Webb, Taylor Tuell, Troy Tuell, Kenneth Ring and Waldo Graham.

Pick Kanawha Valley Safety Winners

FIRST-AID CONTESTS and a parade with floats, ambulances, National Guard units and fire engines marked the 22nd annual Safety Day sponsored by the Kanawha Valley Mining Institute, Inc., held June 27 at Montgomery, W. Va. The winning first-aid teams were announced by Joe S. Mulligan, safety engineer, Semet-Solvay Corp., and director of the meet. Prizes of $50 each to the members of the winning teams and $25 each to the second-place teams were awarded by Joseph Bierer, chief, West Virginia Department of Mines. Trophies donated by Mine Safety Appliances Co. were presented to the company of each first-place team. USBM representatives from Mt. Hope, W. Va., who participated, included W. R. Park, Frank J. Furin, Joe S. Ferraro and Lloyd G. Fitzgerald. J. A. Willis Jr., institute president, gave the welcoming address.

HAZACORD BULLETIN

HAZARD INSULATED WIRE WORKS • DIVISION OF THE OKONITE COMPANY, WILKES-BARRE, PA.

NEW SHUTTLE-CAR CABLE CONSTRUCTION PUTS "HEX" ON STRAIN..INTERNAL ROTATION..FATIGUE

New, Improved Grounding Conductor Gives HEX-TITE Added Flexibility

Hazacord HEX-TITE Type G, provides extra workability and flexibility in grounded cables. The grounding conductor is composed of many more fine wires protected by a cotton serving that forms a smooth channel through which the ground wire can work.

Special Lubricated Strand

Hazard's processing of the grounding strand permits the conductor to work freely without wear or danger of breakage of the strands. This added workability of the grounding conductor permits sharp bending of the cable without fatigue.

HEX-TITE Conductors Provide Exceptional Heat Resistance

Hazard Performite Heat-Resisting Insulation is used in all HEX-TITE Cable. It is suitable for operating temperatures as high as 75C. It provides a safety margin of about 25% to withstand overload surges.

New Hazacord HEX-TITE Twin Shuttle-Car Cable Promises Longer Lived, Lower Cost Trailing Cable Operation

Resisting internal twisting and slippage, new Hazacord HEX-TITE Twin Cable sets a new standard for trailing cable. Hexagonal insulated conductors provide six plane surfaces to form an extra strong mechanical bond with the protective Hazaprene ZBF Sheath. An open reinforcing braid over the hex-insulation is an additional guard against excessive pulling and dislocation.

Special Adhesive Bond

Hex-insulation in the new Hazacord HEX-TITE is treated with a strong adhesive bonding agent for further resistance to slippage within the sheath. Yet, this adhesive permits removal of the sheath for splicing and repair without tearing or damage to the conductor.

Hazard representatives throughout the mining areas have complete information on new HEX-TITE Twin Shuttle-Car Cable. You can also write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

Tough, Hazaprene ZBF Sheath First with Mine Operators

For real protection, new Hazacord HEX-TITE has the famous Hazaprene ZBF Sheath. It offers superior resistance to flame, oil, acid and mechanical damage. And this sheath is pressure-vulcanized in a continuous metal mold for a smooth, dense surface that resists abrasion and tearing. Proof of mold curing is the full description and official approval number P-104BM embossed in raised letters in the sheath.

Prevents Shorting

The rugged Hazaprene Sheath completely encases each hex-conductor, providing a barrier between power conductors and between power and grounding conductor on Type G. This protective wall prevents shorting when the cable is run over and compressed.

MODERN MINING *demands* PROTECTED CABLES

Mine operators everywhere are turning to modern improved methods to step-up their efficiency and production. And in all cases this means greater electrification: with portable power centers, junction and distribution facilities, continuous mining machines, high capacity loading and drilling equipment, etc.

Ruberoid Insulating Tape can insure more economical operation of this equipment by providing complete protection for electrical cables. Ruberoid Insulating Tape strengthens cables with a vise-like grip so that you can drag them anywhere with complete safety . . . through acid pools and over jagged surfaces. Check these seven cost-cutting features of Ruberoid Insulating Tape to assure longer life for your cables:

- Double grip . . . both sides adhesive
- Great tensile strength . . . tough
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- Extra thick . . . one layer insulates
- Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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For further information write The Ruberoid Co., 500 Fifth Avenue, New York 36, N. Y.

The RUBEROID Co.

ASPHALT AND ASBESTOS BUILDING MATERIALS

tember, 1951. Recently, in April, 1952, the $2,000,000 claim was withdrawn at a pre-trial conference.

House Action Kills Curb On Residual-Oil Imports

By a roll-call vote of 242 to 161, the House July 23 sent the Simpson bill, H. R. 5894, back to the Ways & Means Committee. The effect was to kill the measure, which would have limited imports of residual oil in any quarter to 5% of domestic demand for the corresponding quarter of the preceding year. The bill also would have placed special tariffs on lead and zinc and would have provided protection for certain other industries against foreign competition.

The opposition of President Eisenhower and his cabinet appeared to be the deciding factor in swinging a majority against the bill. Failure of the measure to pass the House came as a bitter blow to those who had fought hard to push it through the Ways & Means Committee and the Rules Committee and bring it to a vote. Coal-industry representatives, with the UMWA and railroad interests, had led the fight for the bill.

Coal Company Earning Reports

Truax-Traer Coal Co. for the fiscal year ended Apr. 30, 1953, reports net income of $2,802,337, or $2.21 per common share, compared with $3,346,838, or $2.95 per common share in the preceding year.

West Virginia Coal & Coke Corp. and subsidiaries report net income of $353,015, equal to 71c per common share, in the first 6 mo of 1953, compared with $188,493, or 38c per share, in the same period in 1952.

Lehigh Valley Coal Corp. reports a net loss of $1,146,019 for the first 6 mo of 1953, more than double the $569,093 loss reported for the first half of 1952. Coal sales for the 1953 period declined to $9,586,936 from $13,817,020 in the first half of 1952.

UMWA-USW Merger Talk Grows

Secret talks recently between John L. Lewis and David J. McDonald, president, United Steelworkers of America (CIO), have stirred speculation that something big is brewing in the labor field. Guesses about what's going on or may develop take the following lines: (1) CIO-AFL unity may be speeded by the new Lewis-McDonald relationship; (2) Mr. McDonald may lead his steelworkers out of the CIO; (3) several small unions may withdraw from CIO and affiliate with AFL; (4) Mr. Lewis and Mr. McDonald, bound together by the close ties between coal and steel, may join forces.

Mine Pension Fund Is Ruled Taxable

The Internal Revenue Bureau has told the UMWA Welfare & Retirement Fund that it must pay taxes on its income and that individual miners are liable for income taxes on their benefits. However,

...with TYCOL lubricants on hand!

The "Big Four" of Mine Lubrication! Tycol's Engineering Service has taken another step forward in simplifying mining equipment lubrication. With an overall program: two Tycol oils and two Tycol greases to meet every requirement! Tycol Abryte 90 handles gears and transmissions – a 100% Pennsylvania oil that resists oxidation and maintains viscosity at high temperatures. Tycol Acylkup 4 is a "universal" machine grease with greater load-carrying capacity (for mine cars, too!). Tycol Arvella 65, a low-cost, general-purpose hydraulic oil, services pumps and compressors. Tycol Armitage 10, a highly stable grease, is ideal for antifriction and armature bearings. No need to stock a score of lubricants when four will do the job! And the Tycol Engineering Service is at the disposal of *all* mine operators . . . just contact your local Tide Water Associated office!

Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!

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Atlas 5-ton type F
32" high.
Can be made 28"

The Atlas two-motor 5 ton type F storage battery locomotive is built low to go anywhere mine cars will go. Exposed wheels for easy access. Large battery capacity gives more gathering service per shift. Double reduction spur gear drive in heavy dust-tight housing gives economical maintenance-free service. Ask for details today!

Atlas Engineering service will design locomotives to meet the specific needs of your mine.

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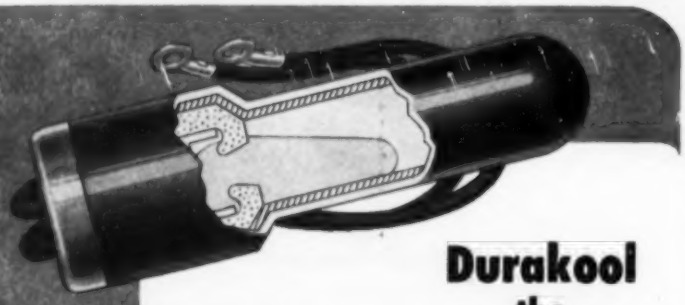

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Years of trouble-free performance on the most difficult of assignments have won top recognition for Durakool Mercury Tilt Switches. High temperatures, fast cycling and 24 hour schedules taken in stride. 7 sizes, 1 to 65 amperes. Send for Bulletin 525.

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DURAKOOL, INC. — Elkhart, Indiana
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Durakool ALL-STEEL MERCURY *Switches*

Meetings

Mineral Producers' Association: Annual Meeting Sept. 17, Hotel William Penn, Pittsburgh, Pa.

National First Aid and Mine Rescue Contest, Sept. 30-Oct. 2, Fort Wayne, Ind.

National Coal Association: 1953 convention, Oct. 19-21, Shoreham Hotel, Washington, D. C.

National Safety Council: Annual convention and exposition, Oct. 19-23, Conrad Hilton Hotel, Chicago, Ill.

Kentucky Mining Institute: Annual meeting Nov. 12-13, Phoenix Hotel, Lexington, Ky.

the Bureau's ruling left a door open by which the fund could obtain tax exemption. To escape the levy, the fund must earmark all the money for specific tax-exempt purposes and must draw a clear line between money for pensions and money for other benefits. The ruling did not make it clear whether the entire income of the fund is taxable or only that part of income that comes from investments. Coal operators have contended ever since the fund was set up that under present UMWA regulations, Mr. Lewis can spend money at will.

Coal-Company Annual Reports Cited by Financial Magazine

Sixteen coal companies in the United States and one in Canada were cited recently by *Financial World* for informative annual reports in 1952. About 5,000 reports from industries throughout the Western Hemisphere were submitted in the annual judging. Award-winning coal companies were as follows: Ayrshire Collieries Corp., Clinchfield Coal Co., Dominion Coal Co., Ltd. (Canada), Glen Alden Coal Co., The M. A. Hanna Co., The Hudson Coal Co., Lehigh Coal & Navigation Coal Co., Peabody Coal Co., Pennsylvania Coal & Coke Co., Philadelphia & Reading Coal & Iron Co., Pittsburgh Consolidation Coal Co., The Pittston Co., Pocahontas Fuel Co., Truax-Traer Coal Co., United Electric Coal Cos., West Kentucky Coal Co. and West Virginia Coal & Coke Co.

And for Your Information . . .

Attorneys for the coal industry have made strong pleas before the Interstate Commerce Commission against freezing into the permanent rate structure the temporary freight-rate increases granted in 1951-52. Coal men based their plea on the fact that the temporary rates fall more heavily on coal than on any other commodity and that the strong financial condition of the railroads does not warrant the increase.

The State Department of Mines, Harrisburg, Pa., estimates that at least 7,274 anthracite miners lost their jobs in the 17 mo since January, 1952. In that period, 52 operations have closed down.

Just like taking out insurance on men, machines and cable

Joy "SPB" Connector with intrinsically-safe control circuit, for gaseous mines.

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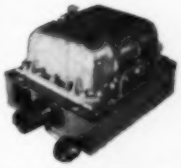
All SCC units are equipped with Joy Electrical Connectors—moisture, oil and wear-resistant—available in a complete range of sizes and types.



Above: Full Height SCC with Dust-Resistant Housing. The Permissible unit for high coal is shown in use, top of page.

Above: Low Height SCC with Permissible Housing, for thin-seam gaseous mines. Single and multiple-outlet types.

Right: Low Height SCC with Dust-Resistant Housing, for entries and non-gaseous operations in thin seams.

Here is *packaged* wiring—the combination of JOY Safety Circuit Centers and Electrical Connectors for individual power take-offs—by far the best and most efficient power distribution system for modern mining machinery. These SCC units not only give you maximum protective value, but maximum productive machine time as well . . . and they're fool-proof, trouble-free, and completely portable. Built in low or high coal models, with permissible or dust-resistant housings, in sizes and current ratings to match any mining requirement. ● *Let us show you how JOY Safety Circuit Centers and Connectors can give you another boost on the road to greater production and lower costs!*

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Shaking and vibrating screens that blind and afford poor service life can waste valuable time and money — eat up profits. The tapered shape of openings and the steps or flanges of Hendrick Flanged Lip Screens provide better separation and practically eliminate costly delays due to blinding.

Ideal for shaking and gravity screens and discharge chutes Hendrick Flanged Lip Screens are furnished with openings varying in size from .010x.025x½ to 10½x11½x13. For more complete information write to Hendrick direct.

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Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

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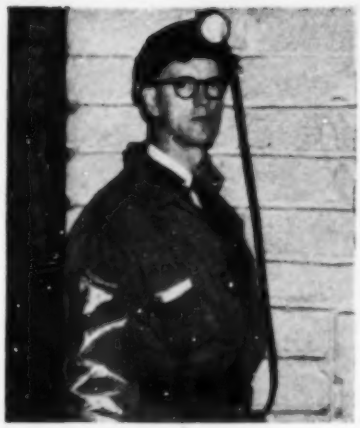

COAL MEN ON THE JOB . . .

CRUCIBLE STEEL CO MINE, Crucible, Greene County, Pa.: Charles B. Tilson, Jr., recently named mine superintendent.

Ohio Valley Electric Corp., a 15-company combine organized to provide electric power for the Atomic Energy Commission from plants at Madison, Ind., and Gallipolis, Ohio, has asked the Securities & Exchange Commission for permission to launch a securities issue of $420,000,000 to finance the two plants and their facilities. The combined installations will provide 2,000,000 kw for the new AEC U-235 plant at Portsmouth, Ohio, and will use approximately 7,500,000 tons of coal per year.

The Ohio Water Pollution Control Board has sent letters to 27 operators of coal-preparation plants in Ohio asking them to file requests for permits as the state's first move to place all coal-washing operations under permit control. Seven of the operators to whom letters were sent already had applied voluntarily for permits. The remainder were given 60 days for voluntary compliance before the board cracks down.

Pennsylvania Coal & Coke Co. in mid-July acquired control of Industrial Brownhoist Corp., manufacturer of earth-moving equipment, from the Allegheny Corp. Brownhoist's main plant is located at Bay City, Mich. The company also operates a foundry at Elyria, Ohio, and owns a Canadian subsidiary. L. D. Silberstein, Pennsylvania Coal & Coke president, explained the purchase as another step in his company's diversification program. The company previously acquired holdings in shipping, oil and natural gas.

A temporary injunction granted July 13 gave the state of West Virginia a victory in the first round of its battle to prevent stripping on conservation property. The injunction upheld the state's contention that a deed granting mineral rights to some 300,000 tons of coal underlying the Kumbrarow State Forest did not permit stripping. The writ was issued against D. S. Blount, Roanoke, Va., operator of Cavalier Peerless Coal Co.

A $500,000 explosion and fire July 19 wrecked the tipple of Rowland & Son

Treads Going Strong

...after 14 years!

Completely equipped with *Kensington* treads, this shovel uncovers an average of 500,000 tons of coal yearly for Shasta. Treads installed 14 years ago appear to be good for many more years of rugged service.

Want to lower your maintenance costs? Then consider the experience of Shasta Coal Company, of Bicknell, Indiana.

Shasta's big shovel, shown here, used to require new treads every 3½ - 4 years. Then, back in 1939 it was fitted with KENSINGTON SUPERMANG treads *. . . and those same treads are still going strong today!*

Cases like this are not unusual. Throughout the coal fields, tough, durable KENSINGTON-built treads are giving many years of bonus service, and thereby saving their owners thousands of dollars in replacement costs.

KENSINGTON engineers have devoted over 25 years to the study of overcoming wear and breakage. They've investigated the working conditions under which treads operate. They've analyzed hundreds of broken treads to discover why they fractured.

This research showed KENSINGTON how to make important improvements in tread design. Supporting ribs were strengthened, other stress-bearing points reinforced. In many cases, roller pathways were widened. This reduced pressure per square inch and thus ended the flow of metal which had caused reverse bending and breakage.

In other cases, KENSINGTON has redesigned rollers, take-up tumblers, and drive sprockets. The result is always the same: *longer service.*

Meanwhile, KENSINGTON metallurgists had perfected ORO SUPERMANG . . . a remarkable alloyed manganese steel which actually *fights back* against wear.

When SUPERMANG is exposed to impact, it develops surface-hardness. This "skin" of extra-hard metal slows wear and abrasion in roller pathways, pin-eyes, and other critical points. Yet underneath this ever-hardening surface, the metal remains tough and able to withstand the impact and stresses which cause ordinary treads to break.

In the rugged Lake Superior iron mining region, for example, thousands of KENSINGTON treads have served under some of the most severe conditions imaginable, yet *none has ever broken or worn out!*

KENSINGTON replacement parts are designed to fit all standard shovels and draglines. Though they can be expected to outwear ordinary parts by many times, cost is about the same as for parts furnished by the equipment manufacturer.

If you are anxious to reduce your maintenance costs during the coming years, you will want to switch to KENSINGTON. Mail the coupon today. You'll be under no obligation.

Kensington STEEL COMPANY

Photos taken in 1939 just before tread at right was installed on Shasta shovel. Comparison with manufacturer's tread at left shows wider roller pathway and other design improvements.

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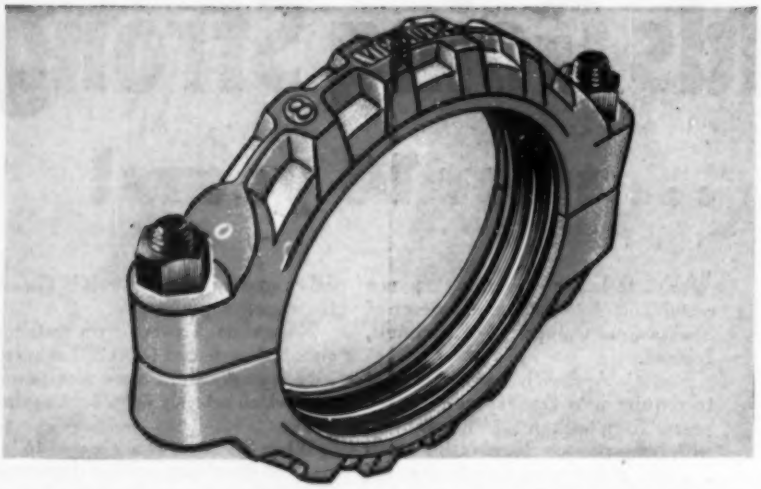

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EQUIPMENT APPROVALS

Four approvals of permissible equipment were issued by the U. S. Bureau of Mines in June, as follows:

Joy Mfg. Co.—Type U725-46E Model FAF chain conveyor drive unit; one 5-hp motor, 230 v, DC; Approval 2-943; June 10.

Joy Mfg. Co.—Type 32D15P battery-operated shuttle car; three 5-hp motors, 90 v, DC; Approval 2-944; June 12.

Thomas A. Edison, Inc.—Type R-4 handlamp; Approval 1027; June 11.

Burgess Battery Co.—Model 453 flashlight; two cells; Approval 619; June 11.

Truck Coal Co., Cuba, Ill. Spontaneous combustion was said to have caused the disaster.

The Knott Coal Co., Knott County, Ky., has established two coal scholarships for the coming year in the University of Kentucky's Department of Engineering. The scholarships will be open to students graduated from the Knott County High School.

The Jacobs Fork Pocahontas Coal Co. mine at Squire, W. Va., recently was shut down for a time by a fire that destroyed the tipple, causing an estimated $300,000 damage. The mine produces some 200,000 tons annually.

A new world's record in earth-moving recently was set by Albert (Blackie) Swelbar's 46-A shovel crew at the Georgetown strip mine, Hanna Coal Div., Pittsburgh Consolidation Coal Co., according to an announcement in *Hanna Coal News*. The new record of 1,522,002 cu yd in 31 days broke a record set August, 1951, when the same crew moved 1,505,143 cu yd. Running 96.88% of full time, the crew handled 2,052 cu yd per hour to set the new mark. Biggest outage came when the substation was shorted out for 2 hr by a coon that crept inside.

The UMWA Welfare & Retirement Fund broke ground July 4 for a 200-bed hospital at Beckley, W. Va. When completed, the structure will cost $3,000,000. It will be the first in a network of 10 hospitals to be built in major coal fields by the UMWA. Dr. John T. Morrison, Washington, D. C., assistant executive medical officer, told those attending the ground-breaking ceremonies that the hospital will be primarily for miners and their families but that it also would be "a part of this community."

Norfolk & Western Ry. Co. has on order a new 4,500-hp coal-burning steam-turbine electric locomotive to be delivered in August. The water-tube boiler, with capacity of 54,000 lb of steam per hour at 600 psi, is fired by a stoker with steam jets.

The strongest rack bar makes the toughest jack

A ratchet jack like the Duff-Norton all-purpose 516 MT is no stronger than its rack bar, the notched steel "heart" that moves up and down holding the load. The forged steel rack bar on this 5-ton capacity coal mining jack is stronger and tougher than the rack bar on any other ratchet jack of this type. It's *stronger* because it's *larger!*

Next time you see a Duff-Norton jack, examine the rack bar; you'll notice it's oblong like this ▬. Then look at the rack bar on any other make ratchet jack. It's smaller, like this ■.

So get the most and best for your money with a Duff-Norton Jack.

Ask your distributor for information about Duff-Norton Jacks for coal mines. There's a jack for every lifting, pulling, and pushing job . . . or write the world's oldest and largest manufacturer of lifting jacks for your copy of "A Handy Guide for Selecting Duff-Norton Mine Jacks." Ask for bulletin Ad 10-J, The Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pa.

Long a favorite with coal miners is the 516 MT. It can raise 5 tons up to 9½ inches, is only 16 inches high when closed, has the famous oblong rack bar for greater strength and dependability.

DUFF-NORTON Jacks

"Giving Industry A Lift Since 1883"

Transite Mine Service Pipe resists corrosion — provides Maintenance Economies

In mine after mine, owners and operators have found from experience that Transite* Pipe strongly resists the highly corrosive action of acid mine water—*from the inside and from the outside.* In constant use, this asbestos cement pipe has withstood the ravages of severe mining service conditions for periods of fifteen years and more without replacement. And these installations can be expected to serve for years to come, as efficiently and economically as when first installed.

Transite Pipe has other advantages important to mine operations. Light in weight, it is easy to handle . . . tight "factory made" couplings make installation easy. It is tough and strong . . . its flexible couplings enable lines to be laid around curves . . . often without use of fittings, a big advantage in restricted mine passages.

Many mine owners are using Transite Pipe for uses other than drainage. Among these are service in fresh water lines . . . for carrying sulphuric fumes and condensation . . . in spray and return lines for condenser towers. For further information, write for Brochure TR-51A. Address Johns-Manville, Box 60, New York 16, N. Y.

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*Transite is a Johns-Manville registered trade mark

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TRANSITE mine service PIPE

Alabama Power Co. Drops Underground Gas Tests

Alabama Power Co. has closed down the experiment in underground gasification of coal at its Gorgas properties. Fires were extinguished June 20 by pumping water into the outlet holes. Refusal of Congress to grant additional funds for continuing the experiment was given as the reason for the shutdown. The project had been in operation since January, 1947. L. M. Smith, president of the power company, pointed out that the project can be resumed at any time in the future when funds are available.

Association Activities

AIME Group Names Head

Anthracite Section, AIME, at its annual meeting July 16 elected Edward G. Fox, president, Philadelphia & Reading Coal & Iron Co., as chairman, succeeding John M. Reid, general manager, The Hudson Coal Co. William Everett, vice president, Glen Alden Coal Co., was named vice chairman, and Floyd S. Sanders, Dallas, was re-elected secretary-treasurer. Directors elected for 3-yr terms are: Robert Van Storch, Kingston; A. F. Hucheson, Tamaqua; Charles E. Brown, Pottsville, and Fred L. Klipple and Frank S. Nicholson, Wilkes-Barre.

Virginia Coal Operators Re-Elect Officers

At the annual meeting of the Virginia Coal Operators' Association, held July 1, at Norton, Va., the following officers were re-elected: George H. Esser, president and secretary-treasurer; H. W. Meador, Stonega Coal & Coke Co., vice president; and E. H. Robinson, assistant secretary-treasurer. Directors elected included Mr. Esser, Mr. Meador, R. H. Hughes, R. S. Graham, E. P. Litton, John Mayhew and M. P. Gilmore.

Big Sandy Operators Name Goldsmith President

W. W. Goldsmith, receiver, Elkhorn Coal Corp., Charleston, W. Va., was elected president of the Big Sandy-Elkhorn Coal Operators' Association at the annual meeting at Campbell House Hotel, Lexington, Ky., June 19. Other officers elected were: chairman of the board, B. F. Reed, secretary-treasurer, Turner Elkhorn Mining Co.; vice president, Virgil D. Picklesimer, vice president-operations, South-East Coal Co.; executive secretary, C. W. Davis; and treasurer, L. B. Brashear, president, Stephens Elkhorn Fuel Corp. J. H. Mosgrove was renamed safety director of the association. Newly elected to the board of directors were: Noah D. Howard, general superintendent, Elk Horn Coal Corp., and William Crawford, vice president and general manager, Princess Elkhorn Coal Co. Other directors, in addition to the officers, are: H. K. English, C. M. Caudill, G. O. Tarleton, S. M. Cassidy, George E. Evans Jr., Dan S. Knausz, J. J. Foster, Davis L. Francis, Joseph Harris, Harry LaViers, A. H. Mandt, J. E. Bowman and R. A. Hedland.

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TO MEET INDUSTRY'S PEAK LOADS

Many industrial users of coal have found that oil treatment with PERMATREAT COAL SPRAY improves handling and firing efficiency as well as providing the best dust control.

ELIMINATES SOGGY STOCKPILES —PREVENTS FREEZING

When Permatreat is properly applied, the thin film of oil on each particle of coal sheds water, causes it to run more quickly off the stockpile and out of the car. Rain and moisture have less chance to penetrate. Stockpiles remain dry and easier to handle in conveying equipment. Dust and fines have less tendency to settle and segregate.

Removal of water from the car and stockpile prevents freezing. Hopper cars, free from ice, unload easily without heating or the use of heavy shaking equipment.

AFFORDS MORE EVEN FIRING —BETTER STOKER FEED

By reducing segregation and wet spots, PERMATREAT assures an even flow of coal to fire bed, prevents back drafts and uneven combustion. A more uniform coal is provided to meet the heavy demands of peak loads.

Since PERMATREAT COAL SPRAY is a petroleum product it helps prevent rust and acts as a lubricant on conveying and feeding equipment.

MORE BTU PER TON

Tests have shown that excessive moisture in coal lowers its BTU or heating efficiency in direct proportion to the moisture content. Since PERMATREAT reduces the amount of water in coal, it will increase the efficiency of your fuel, provide more uniform supply to stokers and give you a hotter fire to meet peak loads.

Call on the Ashland PERMATREAT engineering staff for complete information. Their experience has proved valuable to industry and coal sales-service agencies.

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IMPROVED
TWIN TYPE G

. . . specially designed and constructed for use on SHUTTLE CARS and LOADERS

- Neoprene covered ground wire.
- Cushioned against crushing.
- Conductors and ground wire locked in proper relative positions to withstand repeated flexing, reeling, and re-reeling over guide rolls of small diameter.
- Tough, dense, tight fitting neoprene sheath removable without injury to conductor insulation; safe splicing and terminating.

CHOOSE Collyer

For samples of Collyer Twin Type G Mining Cable with new neoprene covered ground, write COLLYER INSULATED WIRE CO., 245 Roosevelt Ave., Pawtucket, Rhode Island.

Open-Pit Electrical Group

Begins on p. 144

stress-relief cones eliminate corona concentrations at the termination of the shield. The cone is built up over the clean cable insulation to elevate the end of the shield, thus spreading out the stress. Technology has led to greatly improved cables, but cable users have the responsibility of splicing and terminating properly if the full safety factor of the cable is to be realized, Mr. Nelson said.

ROTATING CONTROLS

Maintenance men need not become alarmed when faced with the responsibility of maintaining rotating controls, Mr. Blanchett said. They actually are small motor-driven exciters, one each for hoist, swing and crowd motions, requiring regular inspection of brushes and bearings and periodic cleaning to remove dust. Among the benefits in their use are reduced operator fatigue, faster response from unit generators and, in the final analysis, higher productivity from the excavating units, Mr. Blanchett said.

Such controls are a definite advance in the art of shovel design, subordinate only to the application of Ward-Leonard control and the replacement of series motors with shunt-wound mill-type motors, Mr. Blanchett stated, in pointing out that rotating controls are simple devices with many possible functions.

At the afternoon session, speakers and their subjects were: John Huey, research and development engineer, United Electric Coal Cos., Chicago, "Mining Braun Kohl in Western Germany"; C. M. Dovidas, coal-mine inspector, USBM, Vincennes, Ind., "Aspects of Strip-Mine Inspection"; J. C. Rettenmayer, electrical engineer, United Electric Coal Cos., Chicago, "Mechanical Vibration and Its Effects on Electrical Equipment"; and E. G. Fischer, research engineer, Westinghouse Electric Corp., Pittsburgh, Pa., "Allowable Vibration on Electrical Equipment on Shovels and Draglines."

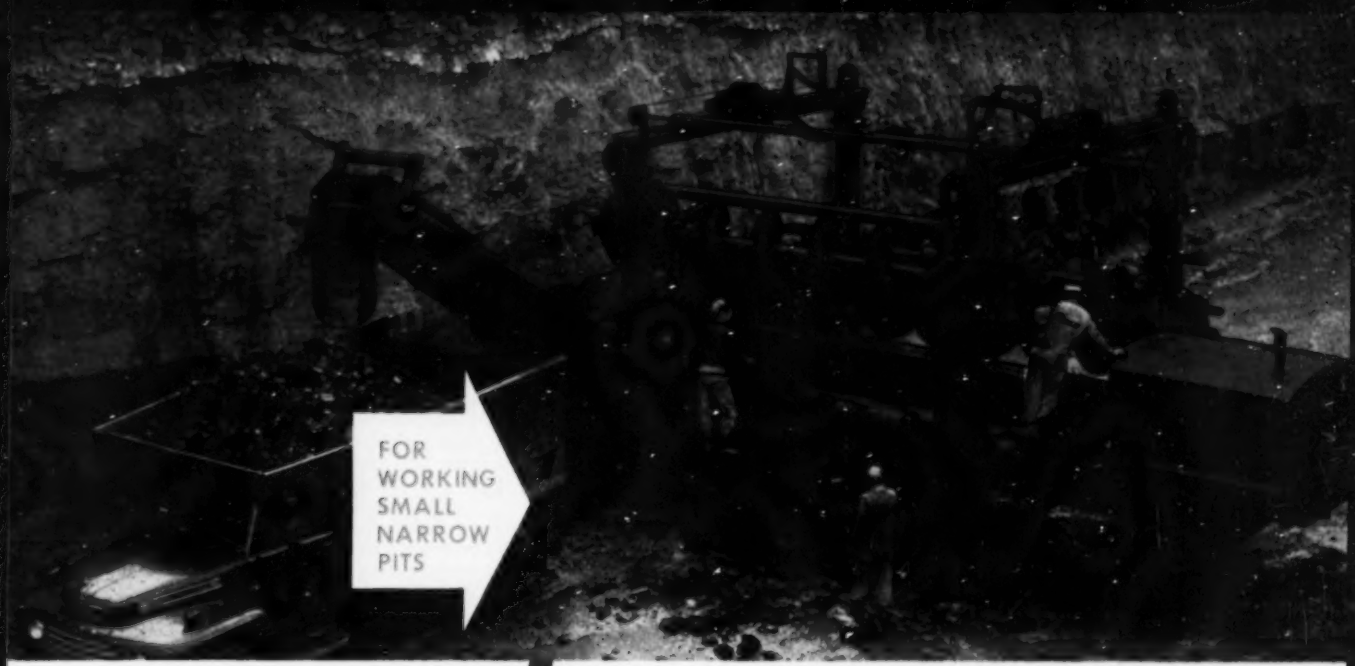
INSPECTING STRIP MINES

Scanning the 1952 record for the Nation's strip mines, Mr. Dovidas reported a total of 30 fatalities, including three supervisors, four drillers, five haulage employees, three electricians, two pumpmen, seven shovel operators and oilers, two tipple employees and four others. Noting that many strip-mine accidents are avoidable, Mr. Dovidas pointed out that several car droppers were killed through failure to take advantage of safety belts, three haulage employees were killed while directing truck drivers from the wrong side, and two welders were killed when an I-beam they had cut out in a tipple fell into a pile of dust, thus raising a cloud which was ignited by their torch.

Other facilities which receive particular attention from inspectors include the use and handling of explosives, safe distribution of electricity and proper posting of safety signs.

Cleanliness, good housekeeping, safe

COMPTON Model 36 Coal Auger



designed for { Maximum recovery ... at Minimum cost

The new Compton Model 36 Coal Auger is the answer to the demand for rapid, economical high wall recovery in small, narrow pits. Only 36 feet long and weighing approximately 25 T., the Model 36 includes all the design advantages of the other Compton Coal Augers.

- Convenient, accessible auger sections racked on the frame.
- Synchronized winches for handling auger sections.
- Hydraulically operated pilot pan eliminates spillage between machine and highwall.
- Elevating conveyor is integral part of machine.
- Hydraulically-controlled swiveling discharge chute permits uniform trimming of trucks.
- Hydraulic jack legs (with self-leveling pontoons for better floatation) allow drilling up to 160 feet without misalignment.
- Single or vertical overlapping holes can be drilled in varying coal seam thickness.

The Compton Model 36 Coal Auger paves the way to higher quality through selective mining! Up to 60 Tons per hour recovered in actual production tests! Plan today to expand your present or future developments with Compton Coal Augers.

(Write for details about other Compton Auger Models 42, 48 and 56.)

Model 36 SPECIFICATIONS

Length: 36 *feet* *Weight: Approx.* 25 *T.*
Carries eight 20 *ft. auger sections*
Required pit width: 38 *feet min.*
Power: 150 *hp Diesel engine*
Hydraulic Frame Jack Lift: 54 *inch*
Auger Diameters: 44 *inch to* 24 *inch*
Possible Drilling Depth: 160 *feet*

The Compton Cutting Head — non-clogging type with a built - in spider bearing assembly — increases production by drilling straighter holes with less frictional drag.

Consult a Compton Engineer for Details

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

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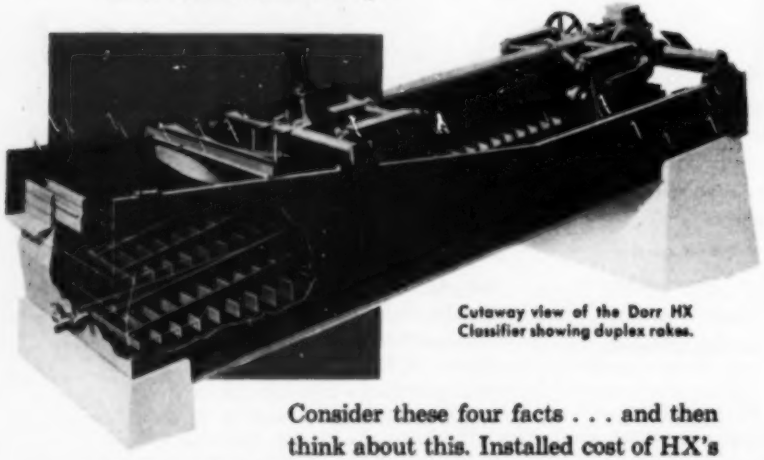
If you use drags in YOUR washing plant ...Look at these Facts

Simple design — rugged construction — no submerged bearings . . . these add up to *low* maintenance. Long term operating cost records in heavy duty metallurgical work show averages of 0.1 cent per ton of solids raked.

Compact HX design will save up to 50% in headroom over a drag installation on a comparable job.

Because pool area and rake speed can be varied, a Dorr HX can easily be adjusted to handle changes in feed characteristics. Conventional drag design provides for no adjustment.

A Dorr HX will unquestionably produce a cleaner rake product and a more uniformly sized overflow than a drag.



Cutaway view of the Dorr HX Classifier showing duplex rakes.

Consider these four facts . . . and then think about this. Installed cost of HX's may be somewhat higher than that of drags . . . but any difference will be quickly offset by low HX maintenance.

Bulletin #2281 gives further details on the HX. Write to The Dorr Company, Engineers, Stamford, Conn.

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storage of materials, adequate fire protection devices in good working order, effective lighting and constant emphasis on safety are necessary to reduce the toll, Mr. Dovidas declared.

WHEEL EXCAVATORS OVERSEAS

Before introducing Mr. Huey, Mr. Hyslop told of a device he recently had seen in Germany which is designed to give a rapid approximation of the moisture content of coal. A measured amount of the coal is sealed in a bomb with a capsule containing calcium carbide. The capsule then is broken to permit the carbide to react with the moisture in the coal. The pressure of the resulting acetylene then indicates the moisture content on a pressure gage which is calibrated to read in percent moisture.

In presenting a series of colored slides showing points of interest visited during a recent European tour, Mr. Huey described the excavators in the pits near Aachen, Germany, as dry-land dredges with capacities up to 1,200 cu yd per hr. Pits are circular, and the overburden is removed along one side by the wheel excavators, loaded into railroad cars and hauled to the other side of the pit, where stacking machines return the spoil to worked-out sections.

In some places, the excavators with 20-ft wheels remove up to 100 of cover to open seams of brown coal 70 to 90 ft thick. Unusual features of the operations include massive cranes for erecting the large excavating units; traveling cranes atop each unit for handling heavy components; counterbalancing long cantilevers which support the wheel assembly or stacking conveyors by housing much of the machinery on opposite cantilevers; and well-designed track suspension systems. On these machines, Mr. Huey explained, the weight-carrying rollers are powered by individual drives, in contrast to our sprocket-drive units. Also, the excavator operator rides in a cab which is close to the digging wheel and which he can position himself for best observation. The cab is fixed to the end of an adjustable boom.

DETRIMENTAL VIBRATION

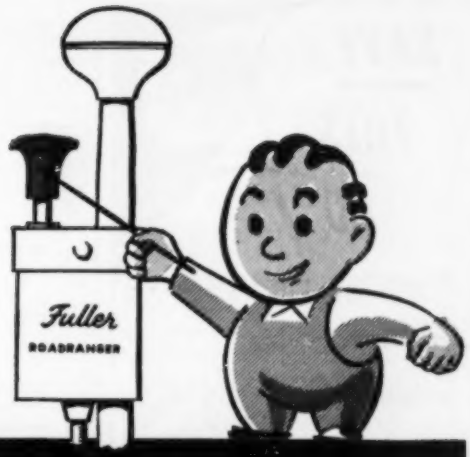
On the subject of vibrations, Mr. Rettenmayer pointed out some of the contributing causes as misalignment, worn bearings and electrical and magnetic failures. These result in high-frequency, low-amplitude vibrations which sooner or later lead to outages. Speed reducers connected to rotating equipment may become especially troublesome when the gears or bearings become worn, thus shifting the shaft centers.

Mr. Fischer followed with an explanation of the fundamentals of vibration theory, including the "forcing function" which finally leads to excessive acceleration of the vibrating member. It is possible to limit forcing functions by mechanical damping in some instances, Mr. Fischer said, thus reducing the possibility of resonant conditions, where the frequency of the forcing function coincides with the natural period of the vibrating member.

Uniformity in terminology, a knowl-

—165

...take your choice



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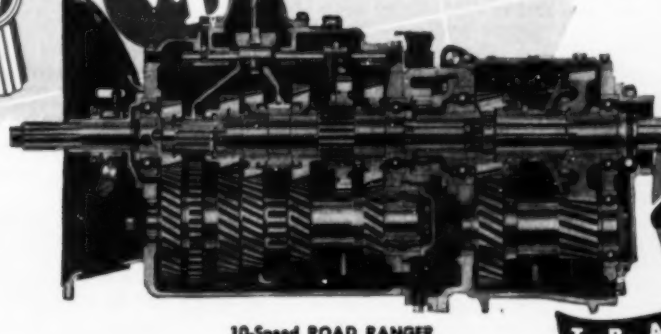
1. No gear splitting—10 selective gear ratios, evenly and progressively spaced. **2.** Easier, quicker shifts—28% steps—one shift lever controls all 10 forward speeds. **3.** Higher average road speed—engine operates in peak hp range with greater fuel economy. **4.** Less driver fatigue—*i. e.* less shifting. **5.** Range shifts pre-selected—automatic and synchronized. **6.** More compact than other 10-speeds. **7.** More cargo on payload axle.

Available in Models R-95-C and R-950-C (overdrive)



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edge of the available instruments for measuring vibration and numerous investigations in the field will provide data, it is hoped, upon which a set of allowable vibrations may be based. Parts leaving the factories pass certain rigid tests on this score, but field conditions may change some of the characteristics of the units. Gears are a source of vibration, Mr. Fischer said, and it pays not to try patching them up in the field.

Nova Scotia Meeting

Begins on p. 140

was complicated by working on filled ground and winter temperatures. Presiding officer at this session was Prof. Flynn.

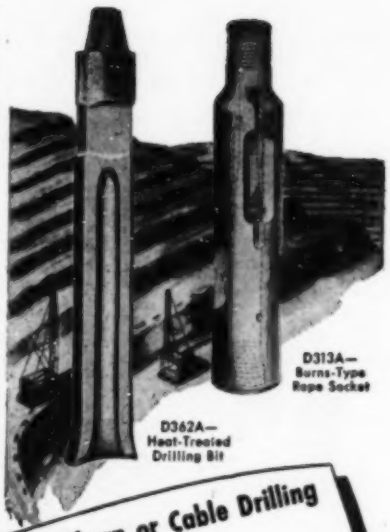
The plant will receive coal both from a new slope serving one colliery and by rail from the other. A separate breaker plant includes a Bradford breaker for removing stone and reducing the size to 6 in. In the main plant, the coal is screened at ¼ in, with the ¼ x 0 going to storage bins or the domestic bins and the 6 x ¼ to a McNally-Norton automatic washer. After washing, the coal is screened to ¼ x ¾ (passed to dewatering screens for additional moisture removal), ¾ x 1¾ and 1¾ x 6. All coal goes to a mixing conveyor for mixing or distribution to the various loading points. Two booms are provided for loading and coal also can be routed to a separate domestic plant.

Design capacity of the plant is 325 tph, with 300 tph going to the main plant after preliminary breaking and rough cleaning. The plant was designed and all mechanical and electrical equipment was installed by company forces. No modifications of any consequence were necessary from the original design.

SAFE MINING

Accident prevention in coal mines was discussed by Mr. Murray following a paper on the "Geology of the Mindamar Mine," by P. W. Richardson. Preventing accidents in and around coal mines, said Mr. Murray, "presents many problems of a type not encountered in any other industry. This is particularly true of the coal mines in Nova Scotia, where the underground workings are very extensive and the area of exposure for workmen is very great." Since the coal faces present the greatest hazards, it is natural to concentrate attention there. In this area, hard-and-fast timbering rules are followed at Dosco mines and emphasis is placed on good housekeeping. As a result, on the longwall faces equipped with Dosco miners in No. 18 colliery only one compensable accident has occurred since the first unit went into operation May 2, 1950.

Training of men is essential to safe operation, Mr. Murray contended, and both management and men must always think, talk and act safely. This will bring safety in transportation and in other mining operations as well as in timbering at the face. "There are no shortcuts in the field of accident prevention," Mr. Murray concluded. "The



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D362A—Heat-Treated Drilling Bit

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D606—Reamer-Type Pilot Bit

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LARGE BITS for pilot hole drilling and stage enlargement reaming of dewatering, ventilation and escape holes.

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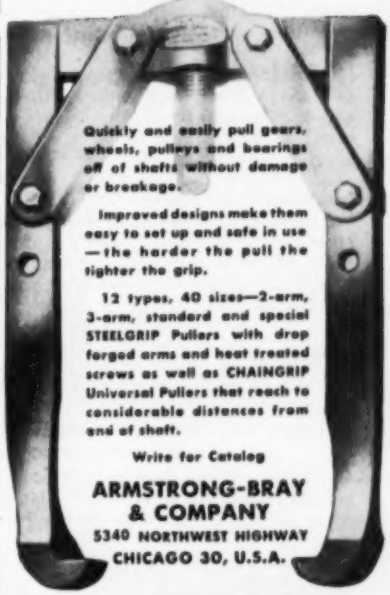

Quickly and easily pull gears, wheels, pulleys and bearings off of shafts without damage or breakage.

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12 types, 40 sizes—2-arm, 3-arm, standard and special STEELGRIP Pullers with drop forged arms and heat treated screws as well as CHAINGRIP Universal Pullers that reach to considerable distances from end of shaft.

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15-yd. Heil H-60 Rock Body with telescopic hoists. Heil bodies can be individually engineered to your requirements for body length and load distribution.

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Remember, when your dump body is Heil-built, it's well-built! It stays on the job and out of the shop. It withstands the daily punishment of heavy loads . . . and comes back for more, year after year. Your Heil distributor can give you the facts about *all* Heil features. See him today!

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price we must pay for success is singleness of purpose, hard work and eternal vigilance."

COAL CONVERSION

Problems and progress in the conversion of coal to gas, liquid fuels and chemicals were analyzed by Dr. H. H. Storch, U. S. Bureau of Mines, in the opening paper of the final technical session, with Mr. Gordon in the chair. Progress has been made, but many problems—technical and economic—remain, said Dr. Storch. Many of these arise out of the complex physical and chemical structure of coal. Reaction to moisture, for example, varies with varying conditions and processes. For example, moisture greatly affects the action of catalysts in hydrogenation and certain other processes.

If the aim in coal conversion is gasoline, the economics are against it today. However, if the process—hydrogenation or other—is adjusted for a high yield of bulk chemicals, there is the possibility of sufficient profit from the chemicals to more than offset losses on gasoline. Most processes can produce 50 to 60% chemicals, and some more.

Synthesis gas from coal, said Dr. Storch, is the key to liquid-fuel production and also to high-Btu gas for final distribution. A major factor in successful gas production is reduction in mining costs. So far, only on process has been developed for successful production of synthesis gas—the Lurgi—and it is improbable that any other steam-oxygen process will show a lower cost. However, a number of old processes are well worth study since basically they offer the possibility of higher efficiency and lower cost.

Concluding a detailed analysis of various conversion processes, Dr. Storch saw possibilities in conversion for chemicals, though the coal tonnage would be small. The major possibilities from the tonnage standpoint are high-Btu gas to supplement or supplant natural gas and oil, and the use of solid fuel to produce electric power.

ELECTRONIC ROPE TESTING

On the basis of experience since Sept. 15, 1947, electronic inspection of hoisting ropes can be relied upon to show rope condition with a high degree of accuracy, said R. Simpson, mechanical inspector, Nova Scotia Department of Mines, who has been in charge of the development of the electronic system since its inception. The equipment is mounted in a truck which is driven to the shaft or slope, where a coil is placed around the rope to provide the readings.

Electronic inspection, Mr. Simpson pointed out, permits checking the entire length of the rope and shows internal conditions which cannot be determined by visual inspection. In addition to accurate determination of rope condition from the safety standpoint, advantages of electronic testing include greater service from ropes because, with accurate data on condition, they need not be removed before they become unsafe, which happens with conventional

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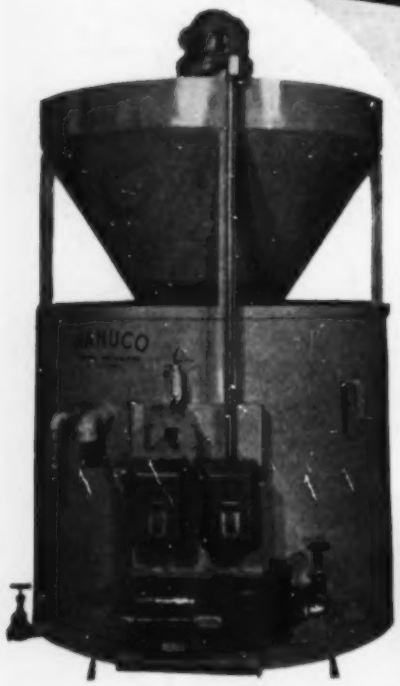

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Peabody Coal Co., Harco, Ill.—Shipment by Deister Concentrator Co. of ten No. 7 SuperDuty Diagonal-Deck coal-washing tables and two Model 109 Concenco revolving feed distributors, each for 5-way feed distribution.

Rochester & Pittsburgh Coal Co., Lucerne mines, Pa. — Shipment by Deister Concentrator Co. of one Model 108 Concenco revolving feed distributor for 3-way feed distribution.

W. P. Stahlman Co., Corsica, Pa.—Contract closed with Jeffrey Mfg. Co. for one No. 200 unit washery handling 6 x ½ at 150 tph.

Wynn Coal & Coke Co., Fairchance, Pa.—Contract closed with Jeffrey Mfg. Co. for one No. 200 unit washery handling 6 x ⅜ at 160 tph.

Jacobs Fork Pocahontas Co., Squire, W. Va.—Contract closed with Jeffrey Mfg. Co. for one No. 100 modified unit washery handling 6 x ½ at 75 tph.

Clinchfield Coal Corp., No. 9 mine, Clinchco, Va.—Contract closed with Roberts and Schaefer Co. for complete dry-cleaning plant equipment including R&S Super-Airflow pneumatic coal cleaners treating ¼ x 0 at 75 tph.

Crescent Coal Co., Central City, Ky.—Contract closed with Roberts & Schaefer Co. for complete pneumatic coal-cleaning plant with R&S Super-Airflow units, cleaning 7/16 x 0 at 50 tph.

Jenkins Coal Mining Co., Earlington, Ky.—Contract closed with Roberts & Schaefer Co. for complete Hydrotator equipment cleaning 1½ x ¼ at 150 tph.

Crucible Steel Co. of America, Crucible, Pa.—Contract closed with Roberts & Schaefer Co. for water-clarification equiment addition to present R&S washery, complete with filters and auxiliary equipment, including Heyl & Patterson cyclones; 33-tph capacity.

Joanne Coal Co., Rachel, W. Va.—Contract closed with Roberts & Schaefer Co. for complete dry-cleaning plant with R&S Super-Airflow units, handling 1¼ x ⅜ at 55 tph.

Lion Coal Co., Wattis, Utah—Contract closed with Roberts & Schaefer Co. for complete Hydrotator equipment, handling 1⅜ x 0 at 20 tph.

Denise Coal Co., Somerset, Pa.—Contract closed with Roberts & Schaefer Co. for complete pneumatic coal-cleaning plant, including R&S Super-Airflow units, treating ¾ x 0 at 75 tph.

Banner Fuel Corp., Toms Creek, Va.—Contract closed with Roberts & Schaefer Co. for complete pneumatic coal-cleaning equipment, including R&S Super-Airflow units, treating ¾ x 0 at 50 tph.

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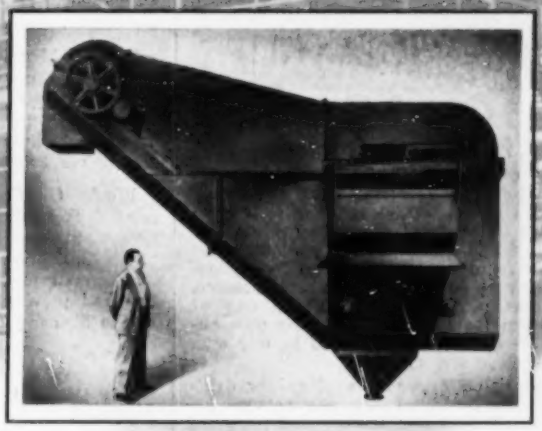
The WILMOT HEAVY DENSITY SYSTEM



The new Wilmot Heavy-Density unit requires 50% less floor space. This sharp increase in efficiency is obviously making possible substantial economies in construction costs – in some cases as much as one-third. The unequalled compactness of the Wilmot unit results from its complete-in-one-unit construction and its unusual simplicity. It contains 5 less major parts and requires 4 less motors.

To these real reductions in capital cost, add the direct saving that results from the fact that the Wilmot Heavy-Density unit is custom-designed to your requirements and local conditions. You are not forced to adapt your plant to a "package" unit.

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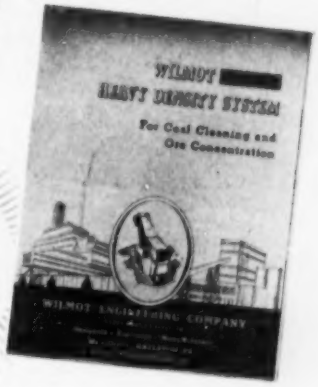
Above, size 150-A Wilmot Heavy-Density unit; feed capacity, 150 tons per hour. Also available in sizes for finished product capacities of 50 to 800 tons per hour. All are custom-designed; and of the complete-in-one-unit construction shown above, requiring 50% less floor space.



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Among the Manufacturers

Mine Safety Appliances Co., Pittsburgh, Pa., has elected two new vice presidents: C. M. Donahue, manager of the mining department and the international division, and E. G. Sanner, manager of manufacturing. Associated with the company since 1927, Mr. Donahue, a graduate of Pennsylvania State College, was named manager of the mining department in 1946, and of the international division in 1950. He also is a director of Mine Safety Appliances Co. of Canada, Ltd. Mr. Sanner has been with the company since 1920.

Hardinge Co., Inc., York, Pa., has elected John J. Cadot, executive vice president, and Robert J. Russell, vice president in charge of sales. Mr. Cadot continues in his capacity as treasurer and works manager, and Mr. Russell remains corporation secretary and sales manager.

Stearns Magnetic, Inc., Milwaukee, Wis., has promoted Gordon E. Medlock, assistant sales manager, to the post of sales manager, responsible for sales of its complete line of magnetic separation and power transmission equipment.

Brooks Oil Co., Pittsburgh, has appointed T. M. Stonerod assistant to the vice president-sales and head of the company's Coal Mine Div. A sales engineer for the company for the past 13 yr, Mr. Stonerod previously was superintendent of the Shenango Furnace Co. mine.

Controlling interest in A. Leschen & Sons Rope Co., St. Louis, Mo., has been acquired by H. K. Porter Co., Inc., Pittsburgh. The Leschen Company, established in 1857, is one of the country's oldest producers of wire rope. Operations will continue as Leschen Wire Rope Co., a division of H. K. Porter Co., Inc., under the direction of D. W. Vernon, vice president and general manager. A. A. Leschen, former president, has expressed a desire to retire.

The B. F. Goodrich Co., Akron, Ohio, has organized two new major divisions integrating sales, manufacturing and necessary staff functions. Arthur Kelly, a vice president of the company, has been named president of The B. F. Goodrich Co. Tire & Equipment Div. Clyde O. DeLong, formerly general sales manager of the company's industrial products division, has been named president of the new B. F. Goodrich Co. Industrial Products Div. Named as vice presidents of the new tire and equipment division were Joseph A. Hoban, formerly general manager of tire merchandising, vice president-replacement sales; E. F. Tomlinson, general manager, automotive, aviation and government sales division, now vice president-equipment sales; and J. E. Gulick, general manager, tire manufacturing, made vice president-manufacturing. Named vice presidents of the new industrial products division were Robert V. Yohe, president of American Anode, vice president-sales; and Rollin D. Hager, general superintendent, industrial products manufacturing, Akron, vice president-manufacturing.

Republic Steel Corp., Cleveland, has elected Norman W. Foy vice president in charge of sales, succeeding J. M. Schlendorf who retired July 1, but continues with Republic in a consulting capacity. Associated with the sales end of the steel industry since 1912 when he was employed by Carnegie Steel Co., Mr. Foy joined the Philadelphia sales office of Republic Iron & Steel Co., a predecessor of Republic Steel in 1918. In 1930, with the formation of Republic Steel Corp., he was appointed Chicago district sales manager, in 1934 became assistant general manager of sales, and in 1937 was promoted to general manager of sales. Other appointments in the company include L. S. Hamaker, formerly assistant general manager of sales, as general manager of sales, and S. A. Crabtree and R. W. Helms, assistant general managers of sales. Mr. Crabtree was district sales manager, Chicago district, and Mr. Helms, general manager of sales, Berger Mfg. Div.

Union Wire Rope Corp., Kansas City, Mo., has established an Eastern Div. comprising 15 states, including Ohio on the west and Tennessee and Virginia on the south, to facilitate the management of its wire rope and sling services. L. A. Price, district manager at Ashland, Ky., has been appointed division manager. R. D. Tripp, district salesman, will succeed Mr. Price. L. A. Davis, Ohio representative, has been named district manager at Columbus; Robert K. Cooke, representative in Pennsylvania, Maryland and West Virginia, is now district manager in Pittsburgh; and D. E. Bedford will continue as district manager at Albany, N. Y., covering expanded territory from the District of Columbia north through New England. J. R. Wells has been added to the sales staff at Ashland, Ky.

United States Rubber Co., New York, has named Warren A. Tipton, sales manager since 1952, general sales manager, mechanical goods division, succeeding Walter F. Spoerl, who has retired after 45 yr of service. A graduate mechanical engineer from the University of Illinois, Mr. Tipton joined U. S. Rubber as a salesman in 1935, was appointed district sales manager for the mechnical goods division's New York branch in 1942, and in 1949 was named manager of all branch sales.

General Electric Co., Apparatus Sales Div., Schenectady, N. Y., has named the following to industrial sales posts: T. F. Mackey, manager of heavy industries sales; K. R. Ross, manager of medium industries sales; W. V. Gough, manager of light industries sales; H. R. Wallrath, manager of contractor and construction industries sales; H. D. Beale, manager of industry products maintenance; and F. W. McChesney, manager of industry sales procedures. GE has

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established a direct-current motor and generator department headed by Oscar L. Dunn, general manager. The new department, located in Erie, Pa., will assume all duties and responsibilities of the company's former DC motor and generator planning study, and will have responsibility for the DC and synchronous motor and generator lines now manufactured by the large motor and generator department at Fort Wayne, Ind., and the armored motor line produced at Erie by the medium induction motor department.

E. J. Longyear Co., Minneapolis, Minn., has appointed Michael J. Gleason, manager, Contract Drilling Div., succeeding Vincent N. Burnhart, who has been named assistant general manager. Mr. Gleason has been with Longyear since 1948.

Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, Ohio, has advanced G. L. Smith, sales manager, to the position of general sales manager. Joining Republic in 1923 as a territory salesman, he was transferred in 1936 to Youngstown as assistant sales manager, became traveling sales manager in 1945 and sales manager in 1946.

Flexible Steel Lacing Co. has assigned Howard Gill to cover the states of Mississippi, Alabama, Georgia, Florida and western Tennessee formerly covered by Austin Webster, who has retired after many years of service.

West Virginia Belt & Cable Repairs, Inc., Mt. Hope, W. Va., has appointed John S. Wood, formerly associated with Jeffrey Mfg. Co., as general manager in charge of conveyor belt sales and the repair plant. A graduate engineer, Mr. Wood has had some 15 yr experience in operating and servicing underground belt conveyors.

Harold B. Ressler, chairman of the executive committee of Joseph T. Ryerson & Son, Inc., Chicago, retired from active service June 30, but remains a director. Mr. Ressler was second oldest in point of service of the more than 4,000 Ryerson employees, joining the company in 1905. During his almost half-century with the company, he occupied many positions of responsibility, becoming vice president in charge of sales in 1932, first vice president in 1950 and chairman of the executive committee last year.

The world's largest continuous heat-treating furnace for steel plates is under construction at its Coatesville (Pa.) plant, the Lukens Steel Co. announced recently. The new 365-ft furnace is the basic piece of equipment around which the entire alloy finishing plant is being reorganized and will provide heat treatment up to 1,950 F, some 400 F higher than conventional continuous heat-treating units for plates. Among other new facilities planned, a new quench press, which will eliminate a large part of the flattening which is usually necessary after heat treating, also will be installed. Continuously mounting demand for Lukens' clad-steel plates has taxed production facilities to the limit and made the current $4 million expansion necessary, ac-

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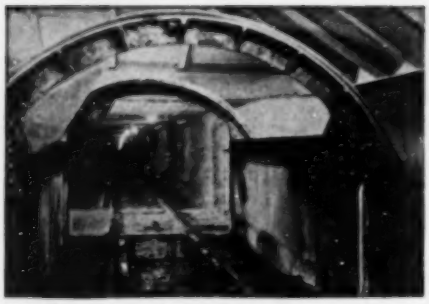
ROTARY CAR DUMPS keep coal coming faster



Heavy Cage Assembly with machined cast steel rings. Rails positively aligned by "Patented" Rail Aligning Stop.

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Many mines throughout the country are attaining new high efficiency in coal production with the Nolan Rotary Car Dump. Distinctive features include:

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cording to Charles Lukens Houston, company president. A long-range program, in progress since 1945, typifies the improvements needed to keep down costs of specialty steels, he said. Lukens has spent $17 million since World War II to improve its output, and will spend another $5 million to complete projects previously authorized. The 143-yr-old company is believed the oldest producer of iron and steel plates in America.

Ward Leonard Electric Co., Mt. Vernon, N. Y., has established a Pittsburgh district office, headed by Leonard H. Wurzel, and located at 3045 W. Liberty Ave., Pittsburgh 16.

Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., has opened a new district sales office and warehouse in New Orleans, La., with Ford L. Brooke, who formerly handled sales of wire rope for CF&I in Louisiana, as district manager. CF&I's new office, at 7930 Palm St., New Orleans, will service not only the immediate area surrounding the city, but a territory comprised of Mississippi, Louisiana, Tennessee and Arkansas.

Worthington Corp., Harrison, N. J., has announced the retirement of Albert H. Borchardt, vice president. With Worthington for 44 yr, he became vice president in July, 1951, assuming the over-all responsibility for the sale of the corporation's entire line of pumping equipment, including centrifugal, reciprocating and vertical turbine pumps.

U. S. Steel Supply Div., U. S. Steel Corp., Chicago, has named Canute R. Olsen manager of the general sales staff, succeeding Harold A. Miller, who has joined the Isthmian Steamship Co. Mr. Olsen, acting general sales staff manager since May 1, joined U. S. Steel in 1936, and for the past year has been manager of the market development division. William R. Holmes has been named district manager of the Cleveland district, succeeding Edwin J. Heffner, who remains in a consulting capacity, and Joseph J. Codd has been made Baltimore district manager. William G. Thornton has been appointed office manager in Baltimore, succeeding Mr. Codd.

Dr. R. H. Crist has been appointed director of research, Physical Processes Dept., Carbide & Carbon Chemicals Co., a Div. of Union Carbide & Carbon Corp. Dr. Crist joined the Carbide organization in 1945 and in 1946 he was assigned to the Physical Processes Dept. at Carbide's South Charleston, W. Va., plant, which is responsible for the corporation's coal-utilization program.

Westinghouse Electric Corp., Pittsburgh, has announced that the former northwestern district has been renamed the Mid-America Region, with headquarters in Chicago. While the new region encompasses the same states as the old northwestern district, some organizational changes have been made to relieve staff managers of direct supervisory duties. A new Chicago district office has been established to better serve customers in the Chicago area, with A. M. Fisher as manager. Replacing Mr. Fisher

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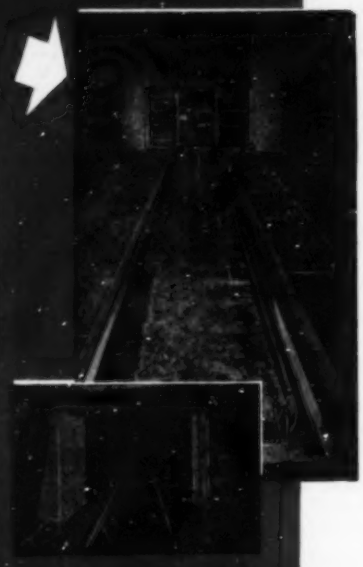

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as regional industrial department manager is V. S. Acton. J. R. Walter has been named regional manager of the application data and training department, replacing C. W. Mills, who has accepted a new position in the Chicago district office.

Thor Power Tool Co., Aurora, Ill., plans the opening of a new sales and service factory branch office in Atlanta, Ga., on Oct. 1. Scheduled to occupy quarters in a building under construction at 1363 Spring St., it will serve distributors and tool users in Georgia, South Carolina, and Florida.

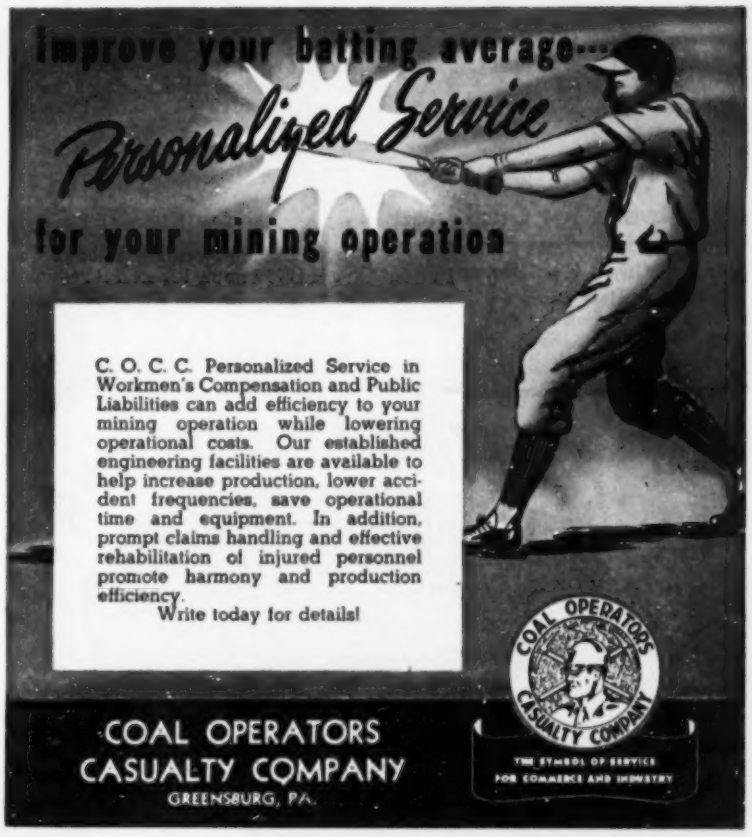
Alloy Rods Co., York, Pa., has started construction on a new plant located in El Segundo, Los Angeles County, Calif. The new plant, known as the Pacific Coast Div., will produce a complete line of alloy arc welding electrodes to serve the entire Pacific Coast and Rocky Mountain states, and is expected to be in full operation by Oct. 1, under the supervision of George M. Hohmann, who is now the production manager of the York plant. The present plant in York is being enlarged to double existing production facilities.

Link Belt Co., Chicago, has completed its second new plant within a year. The new Scarboro, Ont., plant of Link-Belt Ltd., a 72,000-sq ft engineering plant for the design and manufacture of conveying and processing equipment, is located about 10 mi northeast of downtown Toronto. Last December, Link-Belt put in operation a 300,000-sq ft plant at Colmar, Pa., about 25 mi north of Philadelphia. Headquarters for the Canadian company, including general offices, engineering, purchasing, order, accounting, and Ontario district sales, are now located at the Scarboro plant, which provides ample space for enlargement to several times its present size.

Allis-Chalmers Mfg. Co., under its scholarship plan in operation since 1949, has awarded 1-yr $500 scholarships to 35 sons and daughters of employees in its plants, district offices and branches throughout the country. This year, contributions of $500 will be given to each private educational institution attended by students awarded new or renewal scholarships. Under the program it is possible for each student to receive $2,000 in educational assistance while completing 4 yr of college study, provided the student passes the scholarship renewal requirements.

Bearing Specialists, Inc., Cleveland, has announced that the present company name has been eliminated and in the future the corporation would be known as Bearings, Inc., in a move designed to permit faster and better service to customers. The name of Bearings, Inc., also will be used for the corporation's divisions, Ohio Ball Bearing, Indiana Bearings, Pennsylvania Bearings and West Virginia Bearings. These units of the corporation will cease to exist as separate operating concerns and all will now be known as Bearings, Inc.

Sterling Electric Motors, Inc. has ap-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pointed the following additional distributors for Sterling electric power drives: Giles Armature & Electric Works, Inc., Marion, Ill.; W. S. Bain Co., Newark, Ohio; Industrial Equipment Co., Joplin, Mo.; Winkle Electric Co., Inc., Youngstown 9, Ohio; and Erie Electric & Machine Co., Erie, Pa.

New Books for Coal Men

Results With a Heat Pump

Tests of a Heat Pump for Domestic Heating and Cooling, by E. P. Carman. USBM, R. I. 4877. Since 1947, a heat pump has been cooling Mr. Carman's house in summer and warming it in winter. This booklet tells the story of the installation, what it costs, how it works and how much electric power it uses. Naturally, a mass market for heat pumps would mean bigger electric-utility loads and therefore more coal for electric power. *Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Pneumatic Packing Underground

Anthracite Mechanical Mining Investigations, Progress Report 8: Preliminary Testing of Brieden Pneumatic Packing Machine, by C. A. Landsidle, J. C. Hartley and J. W. Buch. USBM, R. I. 4978. The Brieden machine was tested during 1950-51 in an anthracite colliery as part of the Bureau's program to increase anthracite recovery. Studies show that the machine ensures less subsidence than hand-filling methods or scrapers and conveyors; successfully uses wastes from preparation plants; and makes it possible to recover more coal from pillars. Further tests are scheduled. *13 pp. 8 x 10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Mine-Map Reading Made Easy

How to Read a Mine Map, by E. H. Bourland. Here's a well illustrated, down-to-earth booklet aimed at mine foremen and mining students who want to increase their skills. It begins with the simplest terms and symbols and winds up with test questions and answers. It even tells how to fold a mine map. A typical map is included. *30 pp. 9 x 12-in; paper. $2 per copy, Diamond Supply & Service, P. O. Box 1223, Beckley, W. Va.*

Aids to Safety

Handbook of Accident Prevention for Business and Industry. A handy and useful little book with chapters on planning for safety, storage and handling, machine guarding, power tools, fire prevention and control, personal protective equipment, first aid and industrial health, consulting services available and special hazards involved in welding, compressed-air operations and electrical systems. *93 pp. 6 x 9-in; paper. $1.50 per copy to members, $3 to non-members.*

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Other Books and Booklets

Coal Resources of Colorado, a Progress Report, January 1, 1953, by F. D. Spencer and M. I. Erwin. USGS Circular 258. Free, Geological Survey, Washington 25, D. C.

Barrier Pillars in the Western Middle Field, Anthracite Region of Pennsylvania, by S. H. Ash, D. O. Kennedy, H. B. Link and W. M. Romischer. USBM, Bulletin 521. 92 pp. 8 x 10½-in; paper. $1, Supt. of Documents, Government Printing Office, Washington 25, D. C.

T.C.&I. Marks Safety Record, Honors Foreman's Heroism

Short Creek mine, Tennessee Coal & Iron Div., U. S. Steel Corp., Adamsville, Ala., operated throughout 1952 without a lost-time accident, the company recently disclosed. The mine employs 380 men and during the accident-free period produced 457,277 tons of coal. Company officials also revealed that its coal mines all together marked up the lowest frequency and severity rates in their history, the rates being 7.82 and 1.76 respectively. There were no fatalities to be charged against the severity rate, E. B. Nelson, general superintendent of the coal mines, pointed out.

Meanwhile, Luther McAnally Jr., assistant foreman at T.C.&I.'s Concord mine, has been decorated with a silver medal by his company for saving the life of Cleburn R. J. Barnett, motor inspector. Coming in contact with an electrical circuit, Mr. Barnett was paralyzed and rendered unconscious. To rescue him, Mr. McAnally grapsed the only part of Mr. Barnett's equipment not likely to be charged—the rubber-covered cable between cap lamp and battery—and pulled him to safety. He then applied artificial respiration to restore Mr. Barnett's breathing. Mr. McAnally also will receive a Joseph A. Holmes award.

Commenting on the safety record at Short Creek mine, D. W. Hill, superintendent, said that the mark was made possible by the team spirit of employees. "This didn't just happen. It was planned," he said. Supervisors and men set the accident-free record as a goal at the start of 1952. Throughout the year, down-to-earth safety meetings and training were coupled with the most modern safety equipment and tools to make the new mark possible.

Third Grandson Elected Lorain Coal & Dock Director

A. C. Saunders III, Cleveland, Ohio, is the third grandson of the founders of The Lorain Coal & Dock Co. and The Lorado Coal Mining Co. to be named to the board of directors of the two companies. His election took place recently. Now with Reliance Electric & Engineering Co., Cleveland, he is the son of A. C. Saunders Jr., Lorain-Lorado vice president, and the grandson of A. C. Saunders, who, with Edward and Thomas Johnson

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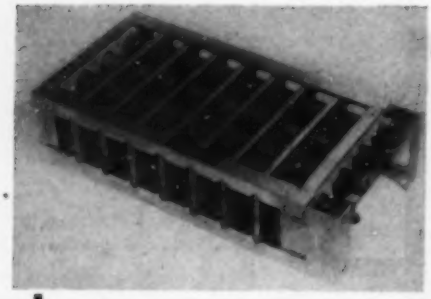

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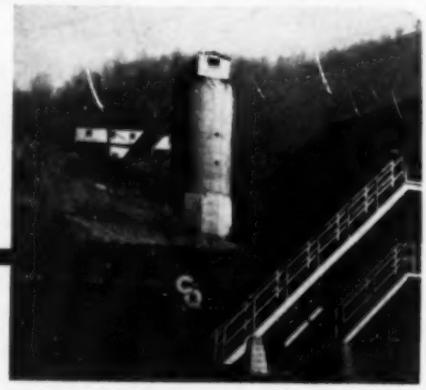

With room for 500 tons of coal in the 24′ x 47½′ Neff & Fry Silo, there's leeway against emergencies at the Stow Tipple mine of Guyan-Eagle Coal Co. For example, if a delay occurs in spotting cars, coal can be accumulated in the silo.

Mine-run coal is conveyed by belt to the silo which is equipped with a spiral ladder to break the fall of heavy blocks. A reciprocating feeder carries the coal from the processing machinery, whence it is loaded into gondolas.

We collaborated with the conveyor manufacturers in engineering the coal handling system, as we have done in erecting silos at many mines. Our experience enables us to design a system adapted to the local situation.

Because our silos have proved their utility at many mines, we believe that they can be convenient and profitable at virtually every mine. If you wish to know more on the subject, your correspondence will be given prompt and courteous attention.

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and Edward Saunders, founded the companies in 1900. The other two grandsons now on the board of directors are E. N. Saunders III, St. Paul, Minn.; and Stanley B. Johnson Jr., Columbus, Ohio, son of S. B. Johnson, president.

Fuel-Oil Storage Sought On Anthracite Doorstep

Abandoned slate quarries in northeastern Pennsylvania soon may become underground reservoirs for storage of heating oil by Esso Standard Oil Co., an affiliate of Standard Oil Co. (N. J.), according to an announcement issued July 1. The company has taken an option on 11 abandoned quarries about 15 mi north of Bethlehem, Pa., with potential storage capacity of 13,000,000 bbl. Storage is expected to help meet seasonal demand for oil. Stored oil will float on water at the bottom of the pit, the level of the oil being controlled by pumping water in or out of the storage area. The Esso operation will be the first of its kind in this country, though it has been successfully tried elsewhere.

Rocky Mountain Meeting

Begins on p. 136

in such new laws work together to achieve the desired ends. However, even this deserved break for coal and its friends (low-tonnage minerals) may come under attack in the future; therefore a defense must be maintained.

Matters of immediate concern, Mr. Hall stated, are the excessive imports of residual oil and imports of natural gas from Canada.

Coal does not appreciate its own strength, Mr. Hall declared, in pointing out that 31 states have coal, making 62 senators who should be made sympathetic to coal and its problems. Furthermore, 17 of the 25 members of the House Ways and Means committee come from coal-bearing states. There should be no reticence among coal operators in making their problems and suggestions known to these and local congressmen, Mr. Hall concluded.

SHUTTLE-CAR OPERATIONS

Excess tension in shuttle-car trailing cables is one of the chief causes of cable failure, Mr. Peck explained, in describing how it should be possible to pull some cable from the reel by hand as a car returns to the face if the tension is about right. From 150 to 200 lb tension is ample to protect the cable from both excess tension and the danger of being run over by the car as it trams to discharge.

Supervisors should periodically check cable tension, Mr. Peck suggested, to be sure operators have not increased it. This malpractice in the use of cable may draw down the copper or stretch insulation, thus contributing to future failures.

In some instances, larger diameter cable may be the answer, Mr. Peck said, by adding the necessary mechanical strength even though electrical ca-

pacity may be somewhat higher than actual requirements.

Mechanical damage resulting from running over the cable, throwing it against the ribs or from backlash also contributes to high cable costs, Mr. Peck continued. To reduce the damaging effects of backlash, cable should be terminated at the discharge station, and if this is not possible, as may be the case in long runs, the terminal should be anchored in a crosscut at a point at least 10 ft from the travelway. Shocks resulting from sudden changes of direction in payout and takeup thereby will be softened.

Electrical heating, which may lead to blisters from distilled jacket material, seems to occur in a pattern accompanying surges in mechanization, such as in the early 30s, in 1940 and right now. In short places the cable remaining on the reel overheats most rapidly, Mr. Peck pointed out. Larger cables, No. 2 for example, are becoming more popular to counteract heating, but operators changing to larger cables should be sure the layup devices on the car are compensated accordingly to prevent uneven spooling of the cable on the reel.

In concluding, Mr. Peck declared that management has the responsibility of educating labor in the use of cable, since only five failures run up to a cost figure about equal to that of a new cable.

Tractor-tread shuttle cars are expected to permit pillar-recovery under deeper cover by operating in pitch rooms rather than strike rooms at Reliance No. 1 and Hanna No. 4A mines of the Union Pacific Coal Co., Mr. Bowie reported. Operating on an average 18% grade, the cars are expected to provide safe, efficient, speedy recovery, thus contributing to better roof control, greater timber recovery and more complete extraction at depths greater than 700 ft, which is the limit for pillar recovery.

Furthermore, the new cars operate better in the fireclay bottom, even though some grading is done at turning points, Mr. Bowie said, and the treads prevent the cars from slipping into the low ribs in strike openings. The Hanna cars, with 12-in sideboards, hold 8 tons and Reliance cars hold 6 tons because of restricted headroom for the elevating discharge.

Peak production, Mr. Bowie reported, has been 132 4-ton mine cars at Hanna on a haul of 250 ft, one way. Average production is about 90 mine cars per shift with one shuttle car in recovering top coal from an entry and worked-out slope.

At the Tuesday morning session, speakers and subjects were: M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., on "Problems, Progress and Profits in the Coal Industry"; C. M. McConnell, mining engineer, U. S. Geological Survey, Denver, Colo., on "Several Aspects of the Collapse of Streeter Mine"; and F. S. Leonard, chief mine inspector, Colorado Fuel & Iron Corp., Pueblo, Colo., on "Roof-Bolting in Coal Mines of the Colorado Fuel & Iron Corp." John H. Emrick, district manager, Joy Mfg. Co.,

. . . and how it performs!

We've been asking you to "See it perform" when the Gundlach 2-stage Double Adjustable Coal Crusher, visited your coal fields.

Now we have positive proof of its excellent performance in the field. Mr. T. J. Gundlach has just completed a trip through the East Kentucky coal fields, demonstrating his crusher at many mines. The results obtained with the crusher, were enthusiastically praised by the operators of every mine that was visited.

Many letters were received, each praising the performance of the crusher. For example, here is a chart taken from one of the letters, showing the results of a test run of coal, again proving Gundlach's superiority in minimizing the percentage of carbon and oversized coal.

	3" x 1¼"	4" x 1¼"	4" x 3"	4" x 3"
1" plus	6.64	6.14	8.25	4.46
1" x ¾"	20.82	23.39	22.92	20.27
¾" x ½"	35.84	33.37	31.17	31.02
½" x ¼"	23.02	20.55	18.34	22.04
¼" x ⅛"	7.24	8.81	9.01	10.50
⅛" x 0"	6.44	7.74	10.31	11.71
Totals	100.00%	100.00%	100.00%	100.00%

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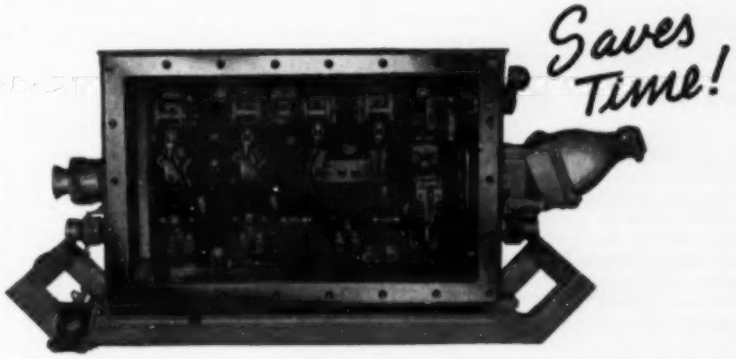

Photograph illustrates Bulletin 5391 — 20 H.P. Explosion Tested Starter with Disconnect Plug.

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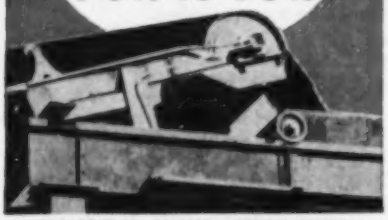

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Denver, and A. M. Keenan, president, Thompson Creek Coal & Coke Co., Denver, were co-chairmen.

COAL'S OUTLOOK

In pointing out that coal finds itself in the midst of a serious challenge to its existence, Mr. Forester reminded his listeners that many in the industry welcomed the re-establishment of unionism as a balance-wheel in stabilizing wages and stopping disastrous price cutting. But years of paternalistic government with labor-courting policies could not be anticipated, and, as a result, in the five years from 1948 through 1952 wages have gone up 39.8%, while the price of coal to the consumer has dropped from $4.99 to $4.87 per ton. In addition the industry has been forced to absorb over this period an added 30c per ton in welfare fund payments and 70c per ton in increased freight rates, Mr. Forester explained.

"We must credit the United Mine Workers with an enlightened attitude on mechanization," Mr. Forester said, but competitive fuels have capitalized on the fact that coal's wages have spiraled to the place where coal is being priced out of the market.

Substantial cost-cutting is the way to recapture lost markets, and cost-cutting opportunities are available in trackless and continuous mining, Mr. Forester declared. Giving credit to the MacKinlay entry-driver and the Denver-conceived Silver-Carson machine as forerunners, Mr. Forester reported that 200 continuous mining machines of various types now are in service after trials in some 30 different seams. Approximately 11,000,000 tons will be mined by these units in 1953. Performance is good and further research will improve their overall efficiency.

Political efforts are temporary, Mr. Forester concluded, in taking the stand that progressive steps from within the industry are required if the problems are to be met and solved.

Non-columnized workings in two seams separated by thick massive sandstone recently resulted in the sudden and complete collapse of Streeter mine in Moffat County, Colo., as pillars from the upper seam were punched into the lower-seam workings. The collapse did not carry over a barrier pillar, however, into a neighboring mine to a detrimental extent, Mr. McConnell reported.

Evidence based upon an exhaustive survey of strata in the collapsed area indicate that such massive strata may be amenable to controlled breakage, Mr. McConnell said.

ROOF-BOLTING

Using a pattern of four roof bolts per row with rows on 4-ft centers, CF&I has supported about 30 mi of entry roof, from 12 to 14 ft wide, and expects to add another 29 mi of bolted entry in 1953, Mr. Leonard informed the institute members and their guests.

Smaller bulk and less weight in comparison with conventional timbers contribute to easier handling, transportation and storage, whether 4-in channels or

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Designed for GREATEST PROTECTION! Built of rugged light weight Fiberglas. Surpasses all standard safety tests, and is approved by the state of Pennsylvania. Deep groove in crown secures lamp cable, gives more headspace, acts like a girder for extra strength. The flared raintrough edge, all around the hat, protects ears from being nicked and keeps water from running down a man's back. Fiberglas is flame resistant and passes dielectric tests eliminating all fear of electrical hazards.

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bearing plates are used. In providing figures for comparison, Mr. Leonard stated that:

1. A channel set weighs less than half a timber set.

2. Space occupied by a channel set is one-eighth the volume of a timber set.

3. For a given weight of roof-support material, twice the length of entry can be supported by channel sets as by timbers.

4. For the space occupied, channel sets are capable of supporting a distance eight times greater than that supported on timbers.

Bolts through planks also have been successful in stabilizing loose ribs in faulted areas, Mr. Leonard said. For this work, special wedges made of 1-in pipe are used to prevent the wedge from driving into the softer coal as the bolt is set. Such installations have held up for over 2 yr.

On the matter of costs, Mr. Leonard agreed that while the initial cost of bolting is higher, tremendous savings appear over the long term in bolted places because of the improved ventilation and the elimination of retimbering costs. In comparing, Mr. Leonard estimated the cost of an installed timber set at $11.75, against $16.74 for a bolt and channel set, but one timber replacement destroys the cost advantage of wood supports.

On the subject of failures, Mr. Leonard noted that the total length of failing roof was 69 ft out of a total bolted length of 205,616 ft. There have been no roof-fall fatalities since December 27, 1949, when one occurred in a timbered entry.

Dry dust collectors are used to capture dust from roof drilling. In many instances, gunite is applied over the bolt and channel installations.

Successful bolting, Mr. Leonard concluded, demands intelligent experiments and close control and supervision to be most effective.

The program on Tuesday afternoon featured a paper entitled "Trends in Demand for Energy in the Western States, 1900-1975," prepared by V. F. Parry, supervising fuel technologist, and W. S. Landers, fuel technologist, coal branch, Region IV, U. S. Bureau of Mines, Denver, and presented by Mr. Landers. Co-chairmen were Walter J. Johnson, president, Sheridan-Wyoming Coal Co., Sheridan, Wyo., and Stanley C. Shubart, Schloss & Shubart, Inc., Denver.

ENERGY-DEMAND TRENDS

The chief market coal can recapture is in the field of power generation, Mr. Landers said, in noting past losses to competing fuels. Annual demand for power in the 11 western states is about 80 billion kwh at present, and it is estimated that it will be 260 billion kwh in 1975, the latter figure reflecting both an increase in population and an increase in per-capita consumption of energy. At present, coal is producing less than 5% of the power, Mr. Landers said.

It is expected that hydropower will increase to the point of supplying 50% of the power in 1975, that oil and gas will go mainly to domestic heating, small industrials and other specialized uses, and that in 1975 coal may be expected to supply the fuel basis for about 117 billion kwh. The changeover to coal for power generation will be gradual at first, and should accelerate as the differential in cost of heat becomes greater in favor of coal over gas and oil, Mr. Landers suggested.

The supply of all fuels is expected to be high for the next 25 yr, and the selection of a fuel will depend on the relative costs of heat from each and the permanence of future supply, Messrs. Landers and Parry predicted.

Present production in the 11 western states is about 22 million tons per year, with less than 2 million tons going for power production and the remainder being used for domestic heating and industrial uses. By 1975, if the trends materialize, annual coal production is estimated at about 92 million tons, Mr. Landers concluded, with 54 million tons being used for power generation and 38 million tons for domestic and industrial uses.

In the discussion, Mr. Landers described the plant now under construction by Texas Power & Light Co. which will burn lignite in the heart of the gas country to provide power for a new aluminum plant. This is a prime example of how solid fuels can compete in the power-production field when supplies of fuel for the future are a major concern and when the cost of heat from solid fuels is at least on a par with heat from other sources, Mr. Landers said. And in a prepared discussion on the role of atomic energy, Clyde Osborn, Kerr-McGee, Inc., Oklahoma City, Okla., pointed out that coal officials must follow developments in this field with interest, in view of the rapid strides being made and the great amount of development work being done. While at present, the cost of power from the atom is high and though the problem of disposal of radioactive waste still plagues investigators, Mr. Osborn stated, power from the atom will become a contender in some areas.

SAFETY IN MINING

The final session on Wednesday morning was given over to a panel discussion of safety questions submitted by members of the institute. Mr. Murray presided, and Lyman Fearn, chief, Wyoming Dept. of Mines & Minerals, Rock Springs, Wyo., was moderator. Members of the panel were: John A. Garcia, chief mine inspector, New Mexico; Leonard Ford, mine foreman, Frederick mine, CF&I, Valdez, Colo.; A. C. Moschetti, chief, coal mine inspection branch, USBM, Denver; Kirk V. Cammack, mining engineer, USGS, Denver; Joel N. Van Sant, chief engineer, St. Louis, Rocky Mountain & Pacific Coal Co., Raton, N. M.; Emery Olsen, safety engineer, coal mine and quarries, U. S. Steel Corp., Dragerton, Utah; F. J. Peternell, safety engineer, Union Pacific Coal Co., Rock Springs; and J. J. Roddy, mine inspector, Colorado Dept. of Mines, Grand Junction, Colo.

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breakline in pillar removal, Mr. Van Sant reported that some experience at his company's mines indicate that wood supports are not necessary to make the break although shooting is sometimes done to get the break. Furthermore, bolting improves the roof in these pillar areas and extraction has increased about 20%, Mr. Van Sant said. Mr. Fearn concurred in describing operations in parts of Wyoming.

On dust control in roof drilling, Mr. Garcia stated that if dust counts show a need for control, then positive steps should be taken by all means. Dust control is a problem in education, he pointed out. Mr. Moschetti pointed out that percussion drilling bears close watching, and advised operators to investigate the collectors now on the market and now under test by the Bureau. Mr. Olsen reminded his listeners that the Federal Code required the use of wet drilling or the employment of a dust collector.

On making the face area safer, Mr. Garcia came out for employee training, and D. R. Ratkovich, coal-mine inspector, USBM, Denver, advocated more support at the face, including temporary supports.

Concerning the benefits which might be derived from a central regional disaster committee, consisting of mine officials and government officials, Mr. Olsen declared that such a group would be of great help in somewhat isolated places, but Mr. Cammack was of the opinion that a committee may be unworkable and that the state inspector should be in charge of such work. T. C. Jackson, superintendent, Hiawatha mine, U. S. Fuel Co., Hiawatha, Utah, agreed with the committee idea if the committee headquarters could have a file of maps covering the mines in the area. E. H. Maize, general superintendent, Sheridan-Wyoming Coal Co., Sheridan, Wyo., informed the group that such plans already are in operation in some parts of the country.

Mr. Roddy advised that such organizations exist in Colorado, but one of the great difficulties is in keeping trained men available. Mr. Cammack reiterated that the states should handle the matter, thus spreading the cost among the entire coal industry of the particular state.

As to whether shuttle-car roads should be wet, dry or rock-dusted, Mr. Garcia said either wet or rock-dusted, but Mr. Peternell pointed out that in pitching coal wet bottom may cause the cars to slide into the low ribs in strike openings.

On precautions to be observed in the use of belts, Mr. Leonard described CF&I belt setups in which a water line is carried in belt openings with regularly spaced water outlets for firehose connections and the installation of fire extinguishers at frequent intervals.

At the conclusion of the program, Mr. Brewster stated that most safety slogans and much of the safety procedure lacks imagination. Something new every morning directed from the safety engineer to the men is one of the best psychological approaches to safe mining, Mr. Brewster said.

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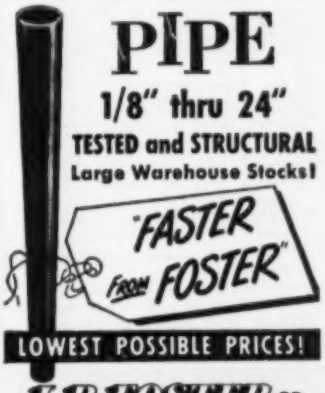

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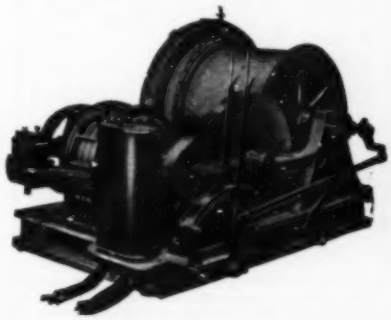

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2—300 KW West. 275 v. 1200R-Syn. 2300 v.
300 KW G.E. 275 v. 1200R-MPC-ATI 2300/4000 v.
200 KW West. 275 v. 1200R-SK-CW 2300 v.
200 KW G.E. 275 v. 1200-MPC-ATI 2300/4000 v.
200 KW Ridg. 275 v. 900R-Syn. 2300 v.
200 KW West. 275 v. 1200 R SK-Syn. 2300-4000 v.
200 KW G.E. 125 v. 1200 R MPC-ATI 2300/4000 v.
150 KW G.E. 275 v. 1200 R MPC-ATI 2300/4000 v.
150 KW G.E. 550 v. 900 vR-DLC-ATI 2300/4000 v.
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ROTARY BLAST HOLE DRILL

The BUCYRUS ERIE 50-R

Increases Drilling Speed

Reduces Drilling Costs

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3. **SPEEDIER BANK PREPARATION.** Drill bits are of the rotating-cone oil-well type. Cuttings are cleaned from the hole by air — your bit is constantly cutting virgin rock.
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12853C

There are many more 50-R features you should know about. For complete information write us soon.

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South Milwaukee, Wisconsin

Smoothing the road to fast production

You can move coal faster, and save wear-and-tear on trucks, when you keep haul roads in shape with a Caterpillar Motor Grader. Note the smoothness of the Cat*-groomed road in the illustration. This No. 12 Motor Grader averages 12-15 miles per eight-hour day maintaining haul roads for Hume-Sinclair Coal Mining Co. of Hume, Mo. In addition, the unit opens roads to new pits.

W. Mack Holmes, in the grader's cab, says, "I've been operating motor graders since 1934. I've never driven any other make, and I don't see how they could make them any better." Cat Graders are fast and easy to operate, with excellent visibility unobstructed by gear housings, anti-creep brakes that maintain control adjustments regardless of load or vibration, and a smooth-shifting constant mesh transmission.

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Only Caterpillar Motor Graders are built entirely by one manufacturer. This means matched performance of grader and engine. And it means skilled service from *one* dependable source—your nearby Caterpillar Dealer.

Ask your dealer for a demonstration. He will be glad to show you how a Cat No. 12 can blade, ditch, scarify, plow snow—and even clean coal seams—in *your* mine.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

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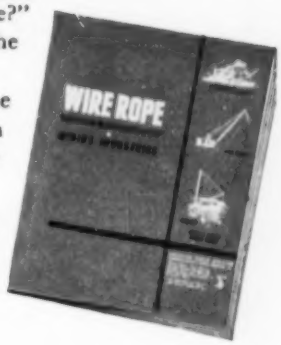
an ACCO product

TRU-LAY Preformed WIRE ROPE

Why Should the Shovel's Hoist Line be Lang Lay?

• Among other reasons, it has more of each wire exposed to wear and will last longer. We might also ask "Why should flattened strand be used for the scraper's cable?" An answer would be—it lasts longer because its relatively flat surface spreads the wear better.

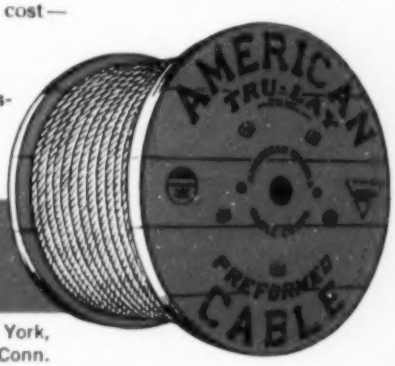
Four different wire ropes are used on the two machines illustrated, three on the shovel and one on the scraper. Each rope is a different construction, and each construction recommended was decided upon by American Cable's engineers after years of careful recording of results of many, many field studies.



This Book Gives Recommendations

Recommendations based on these records are listed clearly in the 12-page "Wire Rope Recommendations for Mining Industries" which shows the best TRU-LAY Preformed construction for the machines you operate. It's full of pictures which makes it easy to find the recommendation you need. Here is a booklet which will help you get longer service—which means lower cost—from every wire rope you use.

See your nearby American Cable distributor who stocks popular TRU-LAY Preformed "Green Strand" Wire Ropes, or write our Wilkes-Barre, Pa., office for your free copy of **DH-128-A** "Wire Rope Recommendations for Mining Industries."



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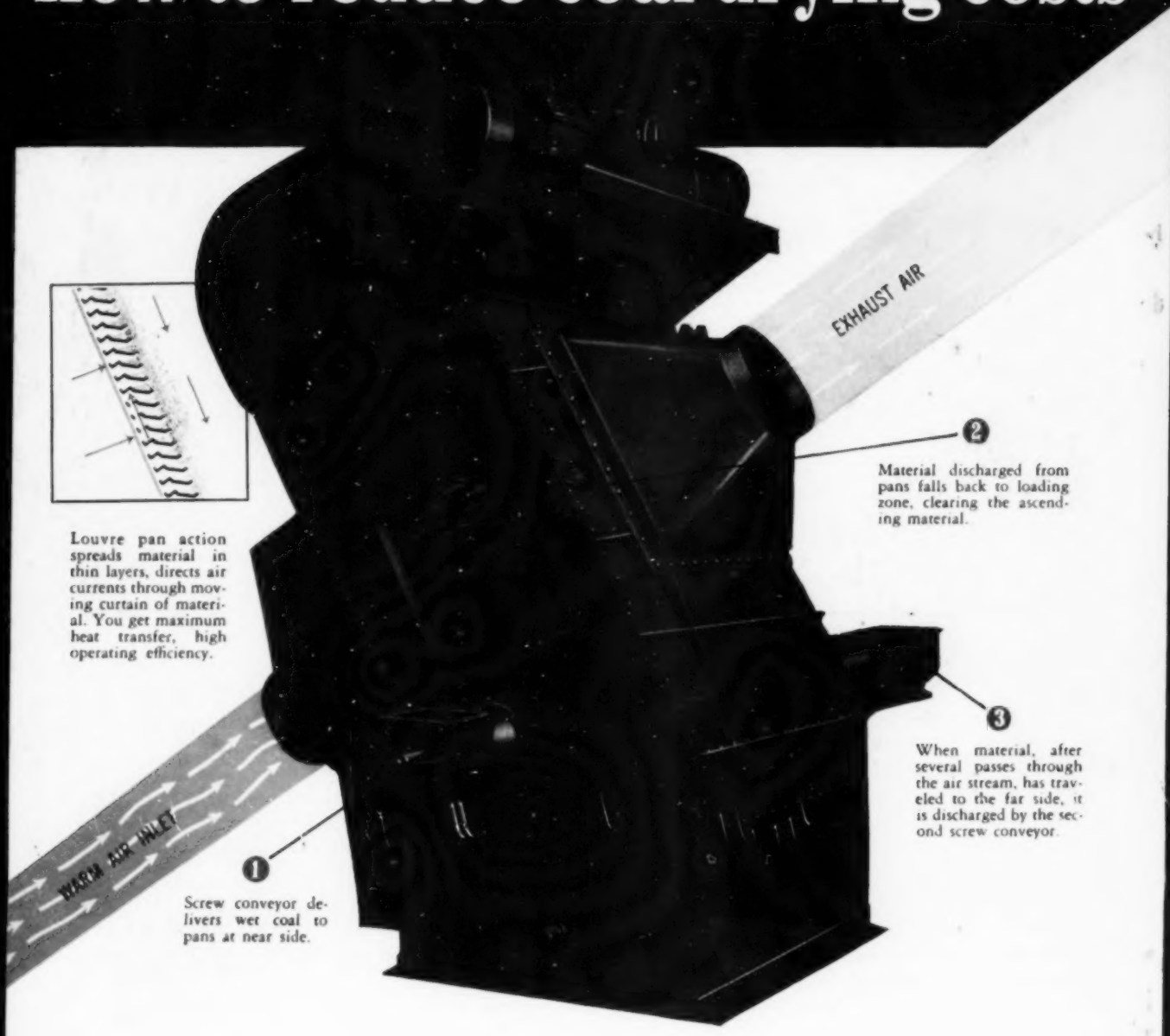
EXHAUST AIR
WARM AIR INLET
Louvre pan action spreads material in thin layers, directs air currents through moving curtain of material. You get maximum heat transfer, high operating efficiency.
2
Material discharged from pans falls back to loading zone, clearing the ascending material.
3
When material, after several passes through the air stream, has traveled to the far side, it is discharged by the second screw conveyor.
1
Screw conveyor delivers wet coal to pans at near side.

LINK-BELT Multi-Louvre Dryer requires as little as one-half the horsepower used by other dryers

IN reducing the moisture of any size coal between minus 28-mesh and 1½-inch pieces, the Multi-Louvre Dryer is fast, safe, low-cost. Its unique design minimizes air pressure drop—*cuts power requirements as much as 50%*. And this low air velocity also reduces degradation and dusting . . . makes effective dust collection easy.

What's more, the low exhaust air temperature assures greater heat utilization . . . also makes possible lower air inlet temperatures for increased output. Simple, *automatic* controls permit varying the feed rate, prevent heat damage to the load in event of any stoppage.

To find out how you can dry as high as 150 tons of coal per hour with a Multi-Louvre Dryer, call your nearby Link-Belt office. Chances are Link-Belt's broad coal preparation experience can give you a more marketable product.

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LINK-BELT

COAL PREPARATION and HANDLING MACHINERY

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 5, St. Louis 1, Seattle 4, Toronto 8, Springs (S. Africa).